

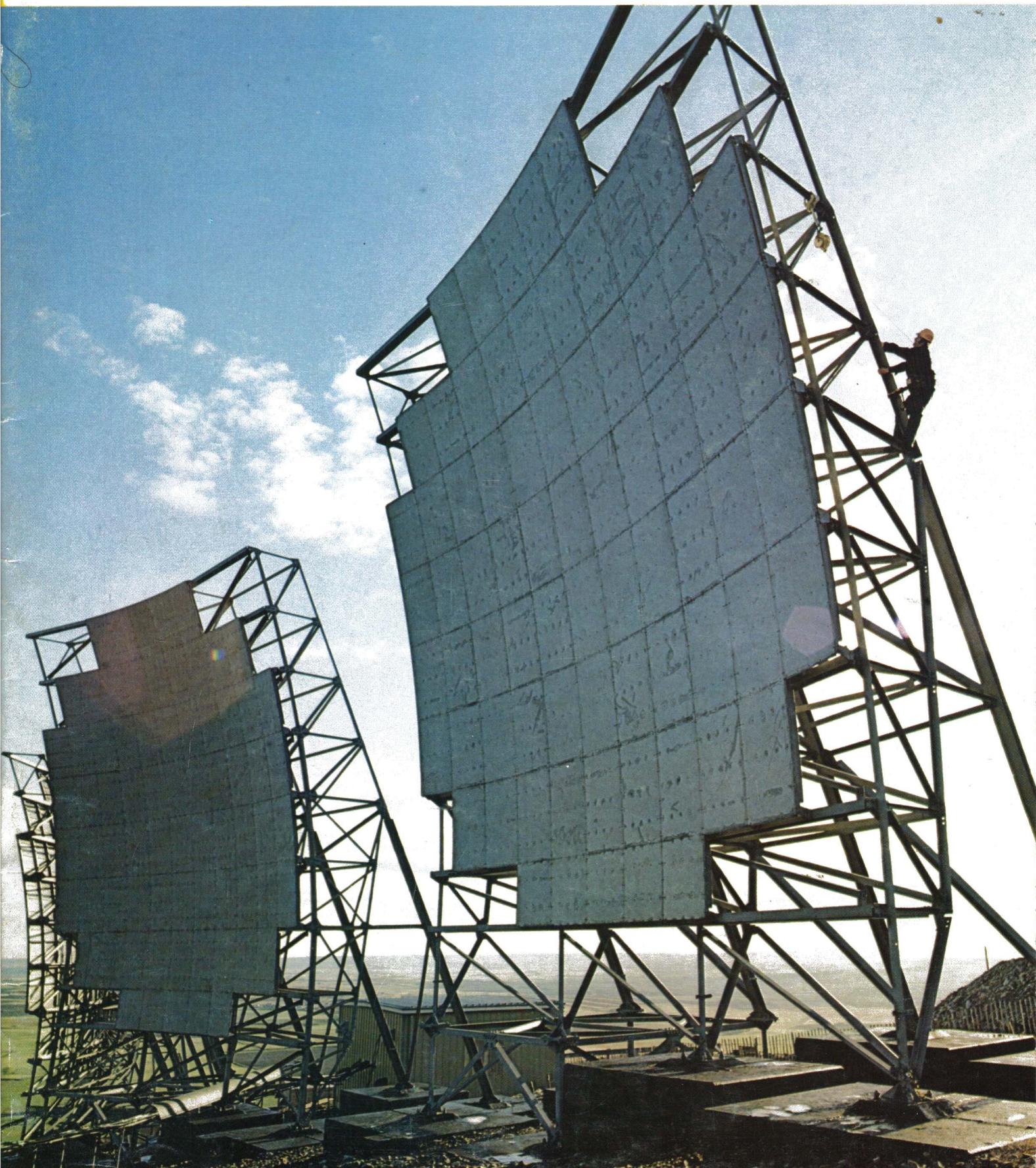
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TELECOM

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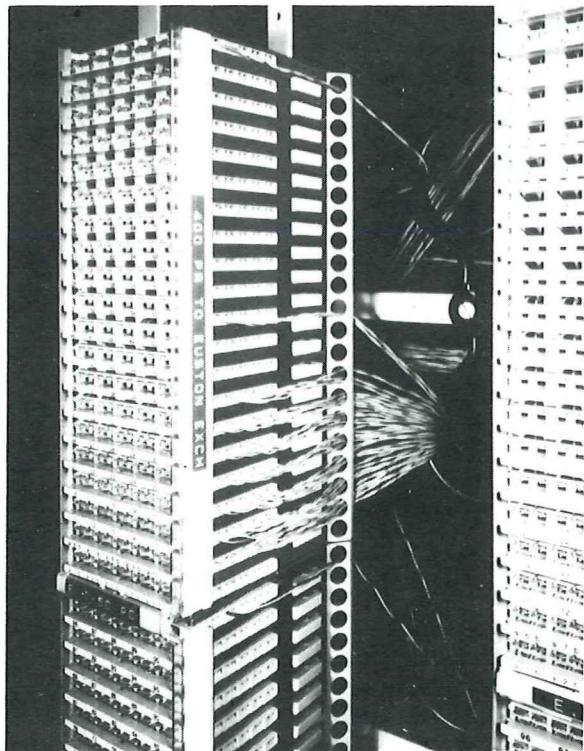
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Spring 1980 Volume 1 Number 1 price 24p



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Krone's new MDF-71 – one of the most advanced main exchange systems in the world – has a lot to offer Telephone Authorities.

Used within conventional exchanges as well as in electronic dialling and data handling systems, the compact, space-saving MDF-71 can be easily installed, even in an enclosed cabinet – and, with its quick-connection components, the LSA Contact strips – provides a greater exchange capacity with a considerable overall saving in installation and maintenance work.

If you want to know more about this or any

other of the many technological innovations that Krone has introduced to national and international telecommunications, call, telex or drop us a line . . . it could be the start of some great changes for you.

The illustration shows a typical MDF-71 installation.

## KRONE

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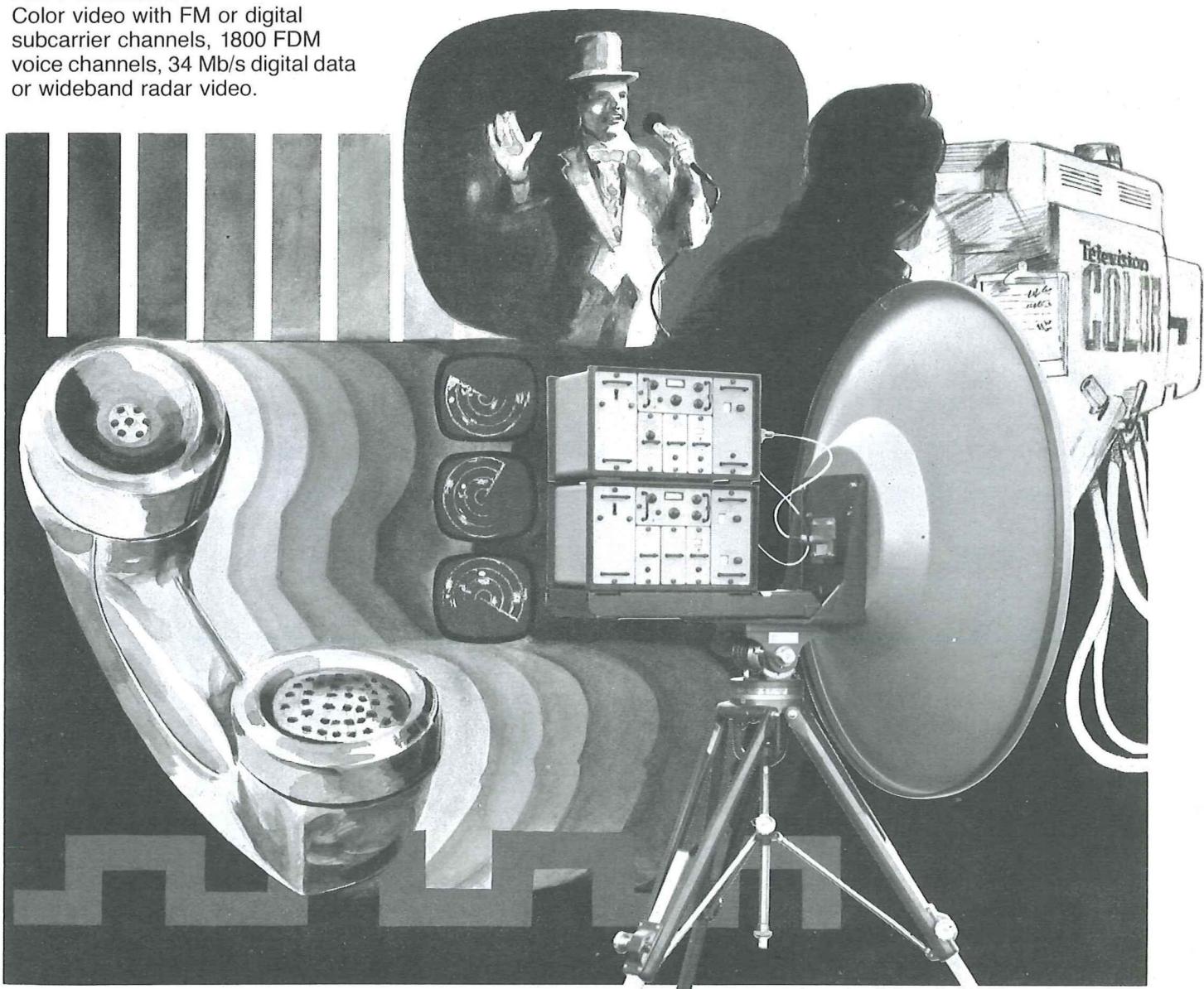
Simplex, duplex and diversity operation in tripod, tower or rack mount configuration.

### Proven Operation

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### Full Performance

Color video with FM or digital subcarrier channels, 1800 FDM voice channels, 34 Mb/s digital data or wideband radar video.



\*TerraCom has been awarded Post Office contract 580678DD for the supply of 50 TCM-6 portable, tunable microwave links. The equipment will be used for telephony and television transmissions in the 2 GHz, 2.5 GHz, upper 6 GHz and 12 GHz bands. This award follows a previous Post Office contract awarded in 1979 for 22 TCM-6 links.



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Whether the call is to the same building or a different continent, The GEC Keyphone 89 is an aesthetically pleasing telephone available in a range of seven colours and is equally at home in a domestic or business environment.

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Telecommunications



GEC manufacture telephones for world markets: table and wall-mounting models, pushbutton telephones, switching telephone systems, and subscribers carrier equipment.

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CF 10

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"DIGICOUNT" incorporates an input circuit specifically designed to overcome the problems associated with mechanical type relay derived pulses, coupled to long lines which generate large voltage swings and have inherent contact bounce and drop out. The input impedance exceeds the open loop requirement, which is in excess of 5 MEGOHM, thus there is effectively no loading under test, this is achieved by a combination of Schmitt triggering and integration filtering followed by digit counting and interdigital pause detection by a unique patented counter which allows for large changes in dial speeds, this is then fed to an internal memory which is multiplexed to drive the sixteen digit display reading from left to right.

"DIGICOUNT" is pre-tested and adjusted prior to delivery to work on 10 cycle, 16 cycle and 20 cycle systems without modification where the line voltage is 50 volts and allows for the nominal voltage drop. Variations on this specification are by request.

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"DIGICOUNT" is delivered in a black 'Texon' case and comes complete with test leads. The unit is powered by 4x 1.5 volt batteries, type AA size.

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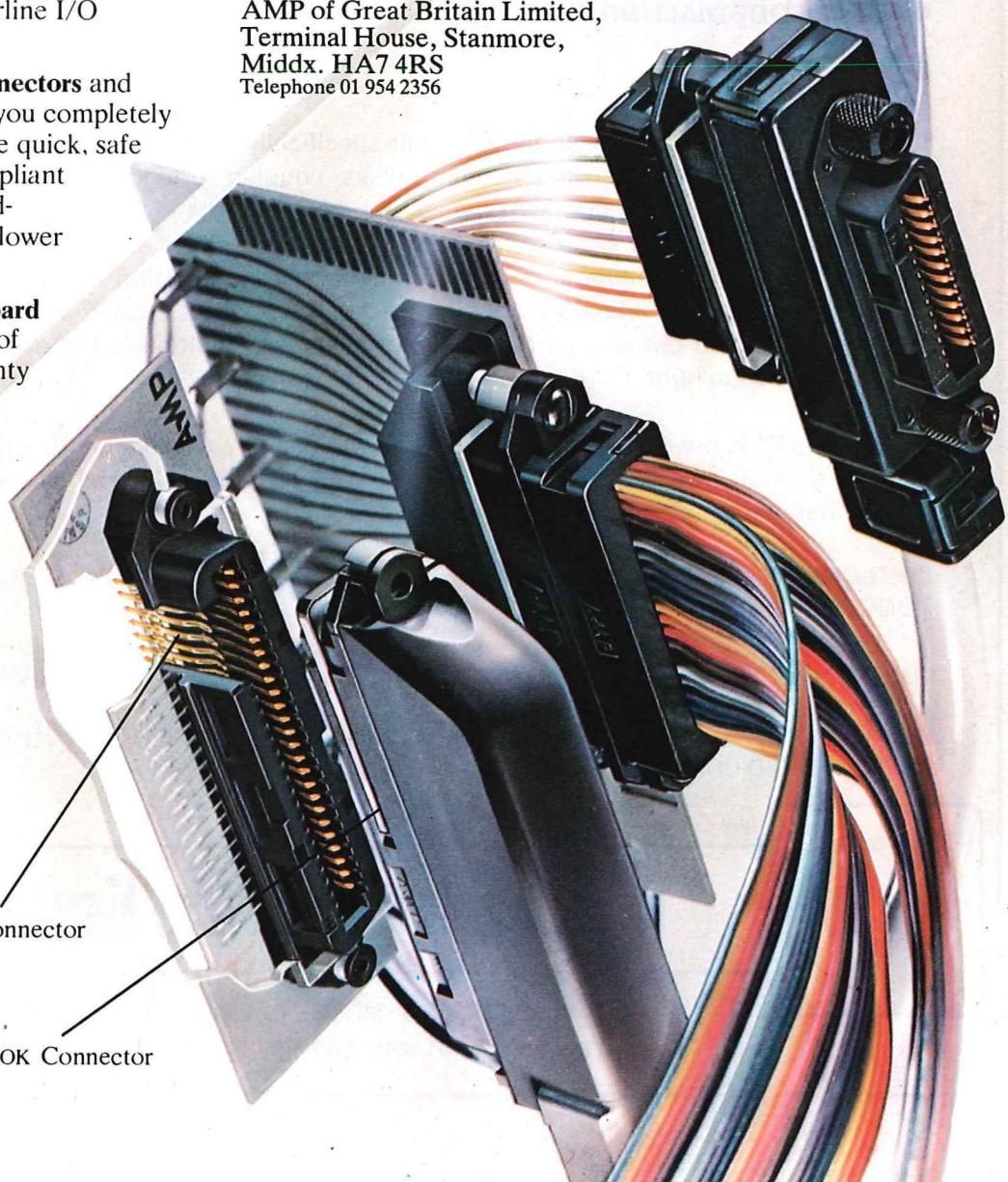
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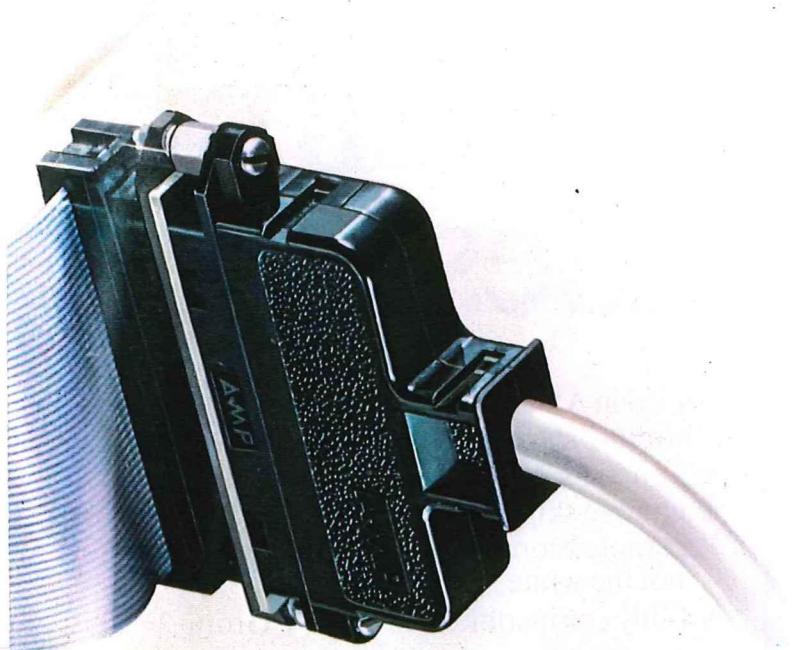
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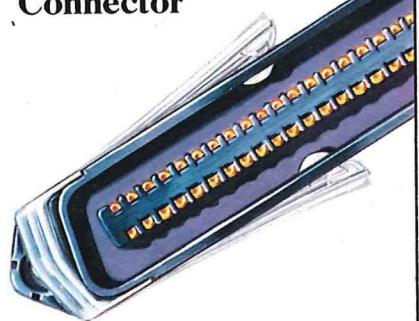
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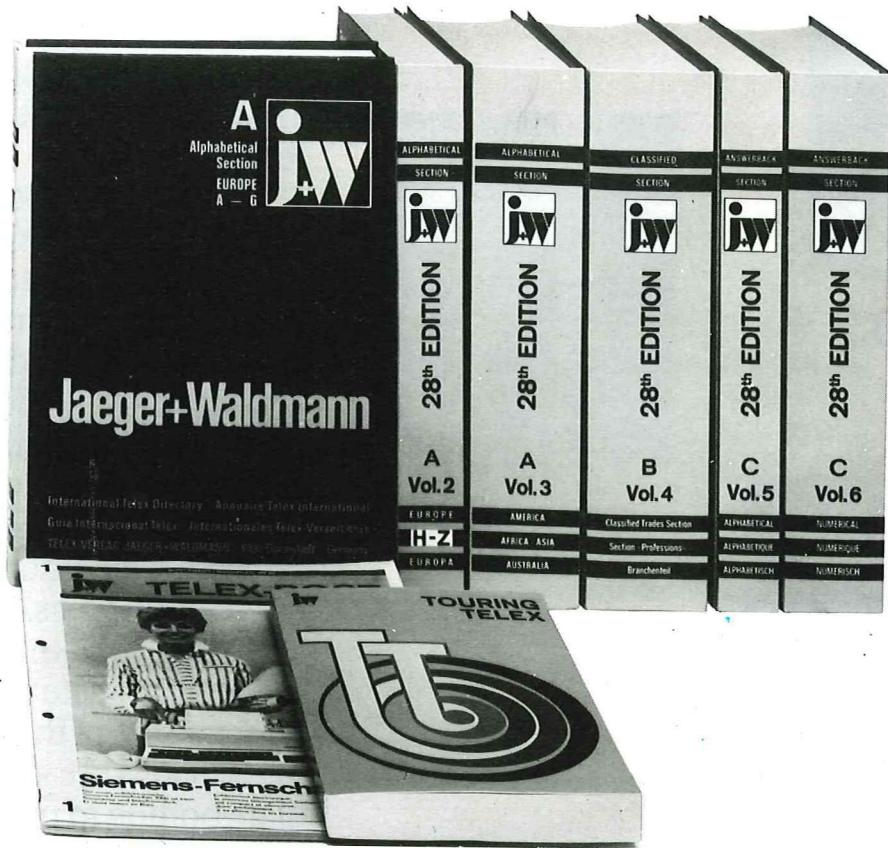
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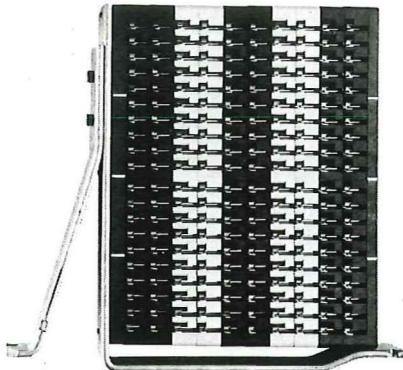
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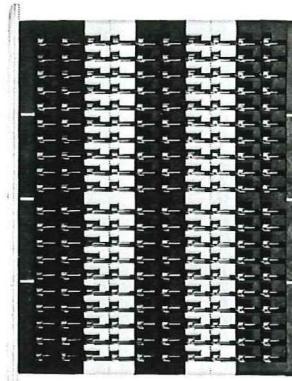
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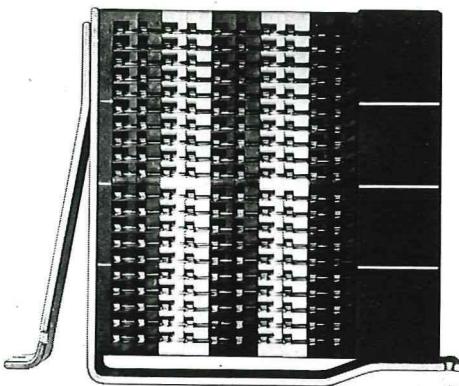
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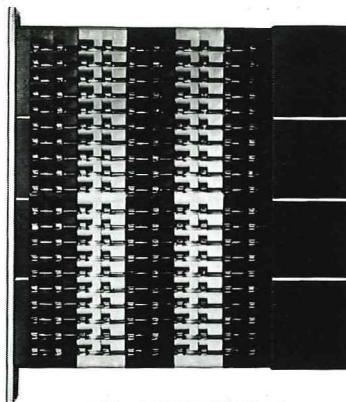
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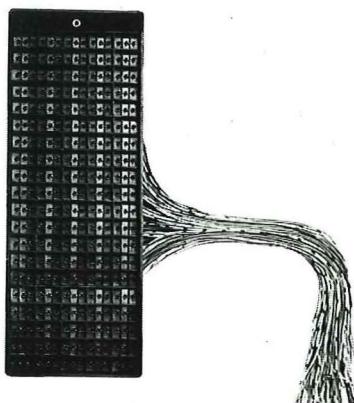
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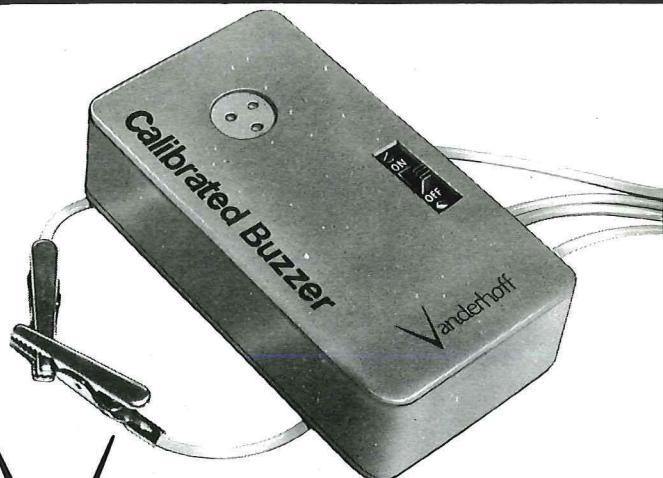
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Current through probes - 140 µA

Buzz tone - 1000 Hz

Current Consumption - 1 - 2.5 mA

Battery life if used daily - 400 hours

Battery - PP3 9 volts

Size - 2½" x 4½" x 1¼"

Weight - 8½ oz.

## Vanderhoff Communications Ltd.

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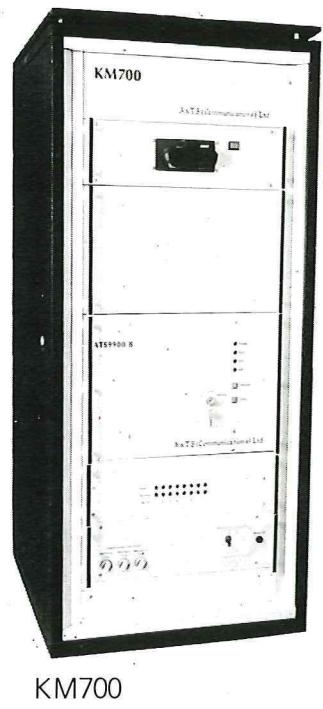
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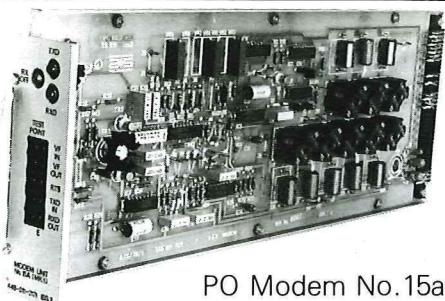
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Yours alone.

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### The single source advantage.

Because Motorola provides a totally integrated telecommunications package, cost efficiency and control can be increased. Every system is tested in our facility *before* installation. And because we are able to design, manufacture and test your system, you don't have to involve a number of suppliers.

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Tel: Harpenden 63141.

**Regional Telephone Numbers:**  
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**British Telecom Journal**

Spring 1980 Volume 1 Number 1

Published by British Telecom, part of the Post Office, to promote and extend knowledge of the operation and management of telecommunications.

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**Cover:** Silhouetted against the sky in the north of Scotland, a rigger climbs one of the tropospheric scatter aerials at Mormond Hill to carry out a maintenance check. The aerial is one of six which receive radio signals from North Sea oil platforms.

# Planning for the future...

Publication of the new Business Plan comes at a time of profound change for telecommunications. Not since the advent of the telephone itself more than a century ago has the communications industry – particularly in the UK – faced such a challenge.

Designed to show the way ahead for the next 10 years, the Business Plan charts the course for the new streamlined 'British Telecom' through the fast-flowing currents of high technology. Already there is a new management structure at headquarters level. Aimed at keeping pace with technological and market forces, this reorganisation will help the new authority to provide the products and services that customers want and will enable it to face any competition.

The Business Plan makes the point that customers will only want to look elsewhere if they are dissatisfied with the performance and price structure offered by British Telecom. It outlines the way in which telecommunications modernisation in the UK network will develop. The key is System X – the all-electronic design which will revolutionise the nation's telecommunications services. Already, the first of these exchanges is to open about six months ahead of schedule and within three years 28 more will be brought into service.

British Telecom must ensure that new products are sold effectively, are speedily provided, and are backed up by helpful and friendly maintenance services. And in emphasising the need for continued telecommunications developments both in the office and within industry generally, the Business Plan points out that business customers must be given the confidence to invest in British Telecom services.

The Business enters the 1980s with a new name, a new management structure and a new outlook. No-one doubts that technological achievement will continue apace – the mighty microprocessor will see to that. In providing the right services and products at the right time and at the right price, British Telecom must show that it is the natural route to the telecommunications market.

## ...and a changing face

A new look. A new name. For more than 30 years the Journal has guided its growing number of readers on an exciting journey through the world of telecommunications. But as the long relationship between posts and telecommunications draws to a close, changes have become inevitable.

British Telecom Journal now looks boldly to the future and will continue to reflect developments in every aspect of the business it serves. Please join us.



# Messages for the medium

**Mr Richard Hooper, recently-appointed Director of Prestel, is no newcomer to viewdata services. Formerly managing director of Mills and Allen Communications, he controlled one of the most influential information providers to the service. Here he outlines how information providers can best use this new medium.**



Over the last eight years or so, the Telecommunications Business has invested significant resources in developing a working viewdata system with the focus so far on technical and engineering objectives. With the opening of the Prestel public service in London in September, however, these objectives have largely been achieved. It is true there are still teething troubles regarding network communication, and there are still technical-cum-political issues to be agreed in international committees' viewdata standards. But the world's first public viewdata system is in operation. And unlike its counterparts in other countries, for

example, France and Canada, Prestel is a production, as distinct from a laboratory system.

There remain two major challenges facing Prestel – the marketing and use of the product. It is characteristic of technological developments generally that the technology runs ahead of man's ability to use and exploit it to the full. The human, creative, and organisational problems that arise in trying to put technology to use, seem to be more stubborn than the initial technical problems involved in invention and implementation.

Scientists, technologists and engineers have produced a bewildering and ever-increasing array of tech-

nological capabilities – satellites, cable television, computer typesetting, electronic news gathering, video discs – but there is often a long gap before they can be fully applied. Indeed, it is often the case that one technology has not been properly exploited before its successor appears on the scene. The difficulties can be anything from general inertia in the face of innovation, to industrial relations, financing, and lack of creative ingenuity.

Prestel presents today's publishers and advertisers with a similar challenge. Almost without exception, those who attend Prestel demonstrations are impressed by its technical design, speed of response, use of colour, and

simplicity. But doubts do still linger.

Prestel is a publishing and communications medium, which comes 'empty' from the Post Office and has to be 'filled' by other organisations, large or small, public or private. Its success over the next few years will depend crucially on how skilfully Prestel pages are filled and refilled in the face of market demand, both business and residential. The Business's common carrier policy towards Prestel is based firmly on the belief that this will invigorate and accelerate a whole range of applications by information-providing organisations.

A couple of years ago, after the pilot trials but before the test service, Prestel was seen in two ways. Many information providers clearly saw it as just another outlet for information already gathered for printed media such as books and newspapers. Secondly, Prestel pages were being used almost entirely to store and retrieve hard data - train times, lists of addresses, facts and figures, directory and statistical material. Prestel pages today show significant changes since that time.

Most serious information providers to Prestel now acknowledge that it is

a new editorial and publishing medium in its own right, not just a derivative of print-on-paper. Material produced with print in mind does not necessarily fit. Print authoring habits are not always appropriate. Job designations and demarcations are different. Two examples are sufficient to demonstrate quite fundamental differences between Prestel and print-on-paper media - page size and routing structure.

By comparison with print, the Prestel page (22 lines of 40 characters) is small. Many people claim that the Prestel page size is a major constraint. But by reversing the argument, it can just as fairly be claimed that the page size is an editorial opportunity rather than a constraint. In these days of information overload, what is now fashionably called 'information pollution', a medium that requires brevity via 75-word parcels may prove very useful. Prestel is the ideal editorial medium for the busy executive who wants to read three, not 300 pages on the question of money supply.

Alongside information providers' recognition of Prestel as a new medium, there has also been a signifi-

**Prestel editing provides a unique opportunity for information providers to avoid 'information pollution'.** Here an editor from Mills and Allen translates on to the 75-word screen in front of her.



Director Richard Hooper explains the Prestel routing structure to a visitor at the Viewdata 80 exhibition, held in March at Wembley Conference Centre.

cant change of view towards hard data. Prestel pages today are no longer exclusively filled with hard data; entertainment in the form of games, quizzes and horoscopes are both prominent and popular. And Prestel is proving to be a richer and more versatile medium than was originally predicted. Pages of text are found increasingly alongside the more established directory-type information.

If Prestel is marketed as universal and comprehensive, user dissatisfaction will be the result. Thus, subtly, the model of the Prestel user has undergone change. Although Prestel must try to accommodate hard data requirements in a selective manner - all intercity train journeys in the UK but not all train journeys in the UK - it must also provide the user with less focussed information needs. Users will come to Prestel on a regular basis to discover what they ought to be knowing, without necessarily a precise objective in mind.

Information providers today are only part of the way up the Prestel editorial learning curve. As with mountain-climbing, it is not clear whether the next sky-line is the summit or yet another ridge. Acknowledging that Prestel as a new medium is only the first step towards establishing exactly the types of area in which it can and cannot be used.

As the number of Prestel sets grows this year, so the editorial challenge will begin in earnest. Because of Prestel's pricing policy, based on pages of information, editorial and commercial marketing objectives run along closely together. This closeness may prove the biggest challenge of all.

# More help for the handicapped

MJ Hagerty

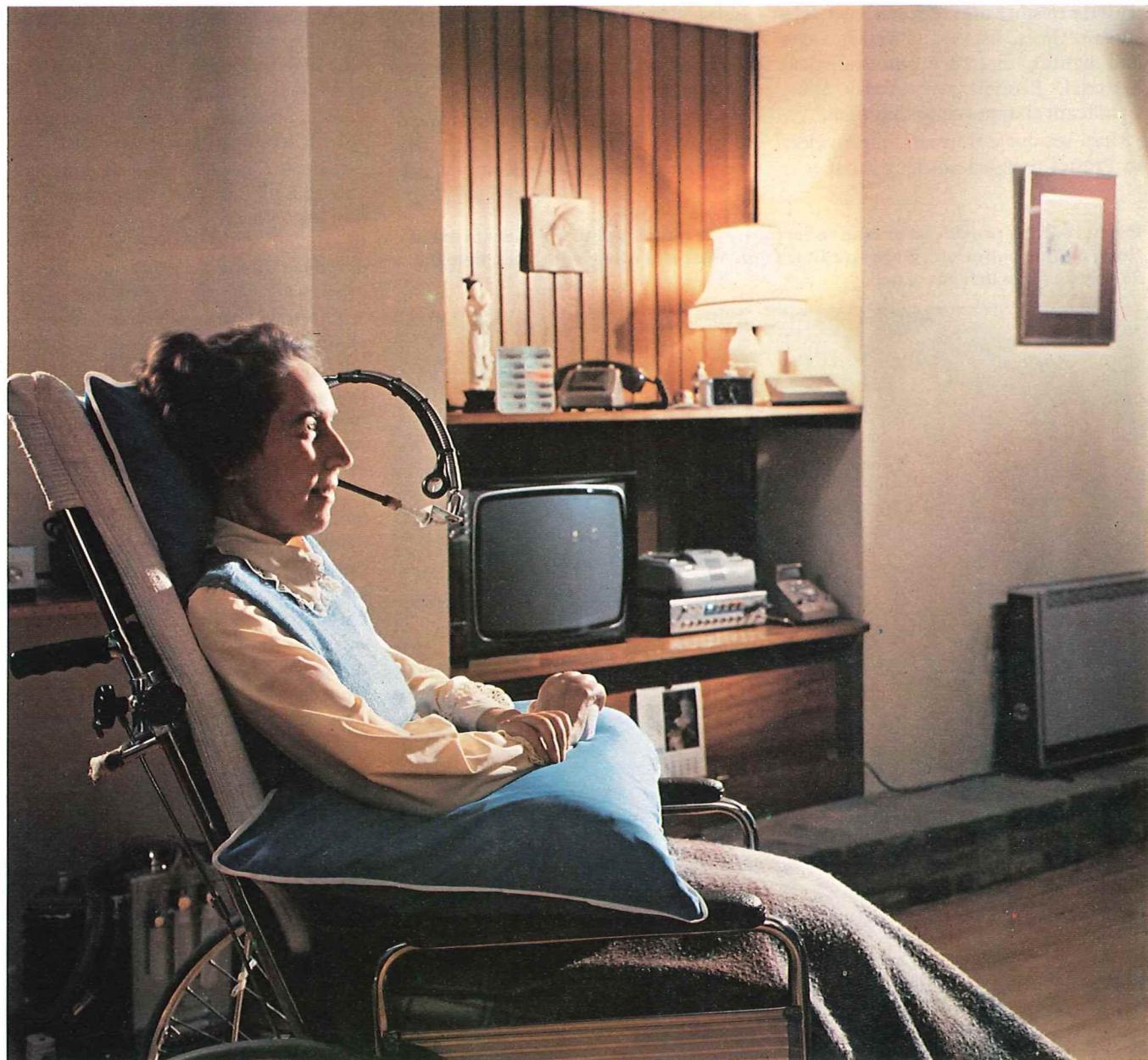
**Few would dispute that the Telecommunications Business has emerged from the 1970s as a highly-respected world leader in providing telephone aids for the handicapped.** Two factors have probably influenced the attitude towards handicapped people in the last 10 years more than anything else.

The first was the introduction of the Chronically Sick and Disabled Persons Act 1970 and the subsequent creation of a Minister for the Disabled. This Act alone had much impact, as it gave local authorities the power to provide, or help to provide, a telephone and any special equipment needed to help handicapped people.

The second equally important factor was the need to bring to the attention of industry, services and individuals what could be done to help a significant minority of the community to lead as normal a life as possible.

The Telecommunications Business has always paid great attention to its handicapped customers, and since

**Ballet teacher Elizabeth Twistington-Higgins uses the loudspeaking Servophone which, when linked with special DHSS equipment, allows severely disabled people to use a suck/blow technique to make and receive phone calls.**



1970, has put extra effort into meeting the ever-increasing demand by improving and extending its range of standard telephone aids. The last four years in particular have seen added determination to publicise its wares.

In 1976, the specially-produced leaflet for the handicapped was redesigned. Colour-coded for ease of reference, the new leaflet is one of the most popular now produced by the Business. But with so many new aids being produced, the leaflet is soon likely to be replaced with a comprehensive booklet containing individual sections dealing with each type of disability.

Another way of making the public aware was the introduction of portable exhibitions in 1977. These were an instant success, gaining wide acclaim from staff as well as the handicapped and their organisations. The exhibitions provided a unique opportunity for showing and demonstrating the wide range of aids as well as for meeting customers and those in the medical profession. But most important, they provided the opportunity to find out first hand what customers really wanted.

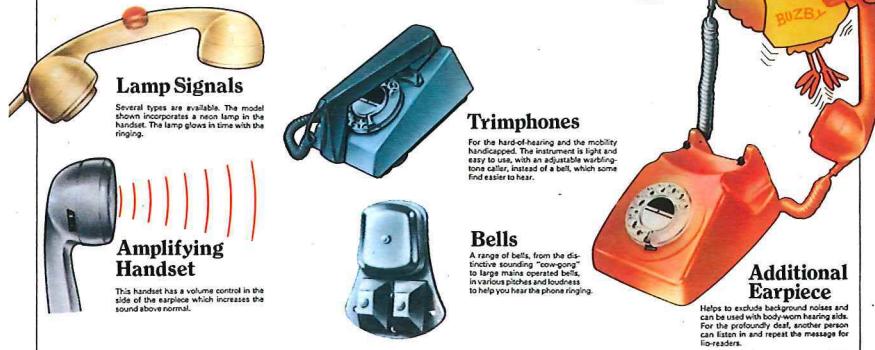
Now shown widely throughout the UK, the displays have been seen at the Ideal Home exhibition, and at the National AIDS for the Disabled exhibition (NAIDEX). Presentations have also been made to the press and to the Post Office National Users Council. The exhibit was also shown at TELECOM 79, the international telecommunications exhibition held in Geneva last year and made a lasting impression.

A special film has also proved popular. Introduced in 1977, 'Life Line' is a warm and sincere documentary reflecting the Business's co-operation with other authorities in meeting the needs of the handicapped. The film won a major award at Geneva last year for the best film dealing with advanced telecommunications and space techniques for the development of mankind.

Posters, too, have proved popular. Two years ago a poster designed for display in doctors' waiting rooms and hospitals was introduced. It illustrates a series of aids for the hard of hearing, and those with impaired eyesight or mobility. The poster's popularity can be judged by the quantity already issued — some 26,000. Another tack was the decision in the same year to enclose an insert with telephone accounts. Following a pilot scheme last year, plans are now in hand for a national programme.

# At your service

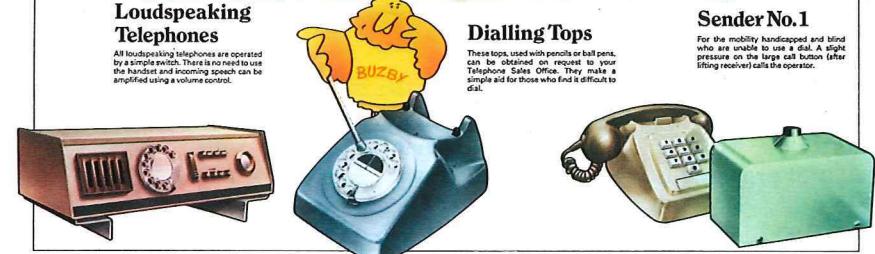
## For the hard of hearing



## For impaired eye sight



## For those with impaired mobility



## We're here to help you

The poster which has become a common feature of waiting rooms in doctors' surgeries and hospitals.

An elderly customer uses the Enlarged Numeral Ring to help her dial her own calls. The ring can be sent on request to customers with poor eyesight.



The result of all these publicity ventures was to increase the pressure to introduce new aids as quickly as possible. The appearance of the Enlarged

Numeral Dial Ring in May 1977 was quickly followed 14 months later by a self-adhesive version in a 'do-it-yourself' kit. This new approach eli-



minated the need for costly engineering visits and enabled the now popular and highly-effective aid to be offered very cheaply.

Help for the severely-disabled came in April 1978 with the introduction of an improved Servophone, which allows people to make and take their own calls unaided. Already, about 1,000 UK users benefit from this equipment. Without Servophone, linked as it is to the Department of Health and Social Security's Possum unit, many of these patients would be unable to live at home. Servophone also attracted great interest in the Geneva exhibition last year, and its appearance has resulted in two overseas applications to buy this highly-sophisticated equipment.

A special aid for the hard of hearing was introduced in July last year for those who wear hearing aids incorporating a pick-up coil. The Inductive Coupler has made a tremendous impact on the lifestyle of those people who until now could only use the telephone with great difficulty. Although industrial action delayed its effective introduction for many months, the Inductive Coupler has now completed successful trials in public call offices and may be used in selected call offices, particularly at the roadside, in railway stations, at docks and in airports.

Trials of proposed new equipment at Pinderfields Hospital in Yorkshire during 1977 and 1978 run jointly by the Telecommunications Business and the Department of Health and Social Security proved the need to test aids on potential users. Not only must any new device satisfy any technical and medical conditions but customers must like it too.

The Enlarged Dial Rings and Inductive Couplers are just two of the aids tested with the close co-operation of the DHSS and the many specialist organisations who provide the names of handicapped people willing to test new apparatus. This co-operation has strengthened Telecommunications Business links with the associations and apart from meeting their representatives at exhibitions and presentations, the Business offers practical help and advice to their members.

The vigorous research and development programme pursued through the 1970s will bear fruit in the 1980s and further strengthen the range of equipment. Already there is:

■ The Payphone Coin Aid which will help customers in hospitals, homes and institutions who have trouble



with inserting coins into the slots:

- The Fingerguide which is designed to help all who suffer from palsy or hand tremor when using Push Button Telephones:
- The Inductive Coupler used in public call offices to help the hard of hearing on the move:
- Stalk Telephones which will provide a convenient solution for those who have problems using a handset for any length of time.

As far as blind operators are concerned, research has centred on finding a suitable alternative to the operator's display in new modern high-technology switchboards. One approach, considered jointly with the Royal National Institute for the Blind and the National Research Development Corporation, has been to use an electronic voice in place of the visual display unit used by sighted operators. An alternative, and simpler device, is a light sensor which identifies calling lamps for a blind operator.

For the very deaf the Business is planning a three-pronged approach. The first is a simple device with lights which recognises line conditions and enables a deaf person with speech to communicate using an elementary code of responses. The second is the use of a sophisticated typewriter-style

**Mr Paddy Hagerty, author of this article, demonstrates the position of the inductive coupler to Mrs Vivien Wright who runs the advisory service for the Royal Institute for the Deaf.**

unit with a standard keyboard. This incorporates hard and soft copy for use over the telephone network.

But the most important contribution to the deaf will probably come from Prestel. It is technically possible to communicate with each other using this system of linking the telephone to the television screen. Prestel's significance for the deaf is that it will enable them to communicate with everyone, not just fellow sufferers.

The Telecommunications Business enters the 1980s confident in its approach to the handicapped and determined to see as many people as possible have the opportunity to play a full role in society.

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**Mr M. J. Hagerty is a Senior Sales Superintendent in THQ Marketing Executive's Residential and Customer Services Department responsible for the marketing of aids for the handicapped.**

British Telecom Journal, Spring 1980

The 1980s will be a time of rapid and unprecedented change for telecommunications. Already the stage has been set. The Post Office Telecommunications Business is to be separated from the present Post Office Corporation and formed into a new body called British Telecommunications, or Telecom for short. The Post Office Corporation will continue to operate Postal and Giro Services.

There are other equally profound changes in the air. The Government is considering changing the Business's rights and duties concerning the provision of customer apparatus so it must learn to thrive in the bracing climate of competition. Technology is changing faster than ever before and will make it possible to do better and more cheaply the things done now, such as the introduction of new services which make greater use of the network. In the United States, technological advances in satellite systems are leading to the prospect of specialised networks which could bypass the established carriers' networks.

Politicians and customers however, will only want to look elsewhere for their products and services if they are dissatisfied with the Business's performance and prices. There must, therefore, be a drive towards an increasing improvement in the quality and range of services, speed of provision and price structure to capture and maintain the trust of customers. Even in a competitive environment it must be demonstrated that the Business is the natural route to the telecommunications market in the United Kingdom.

The basic challenge, then, is to give the customer telecommunications services that are first class in quality, range, and value. At the same time, financial targets must be achieved while providing fair conditions of employment and the Business must learn to adapt to a new and competitive market environment. And it is in fact well placed to face competition: it has unrivalled strengths, a highly-trained staff able to provide and maintain service anywhere in the land, and the foundations of a first-class network.

But there are limitations, too. Shortages of some key skills and a tradition that is unaccustomed to the competitive thrust of giving customers what they want when they want it, and thus a ready acceptance of change in working methods and customs, come under this category. Much as the Business would like to compete across the board

# Business blueprint for the 80s

## AV Knight and R Wernham

**Recent technological advances promise to make the next decade one of the most exciting in the history of telecommunications. The latest Business Plan aims to ensure that British Telecom is fully equipped to meet the scientific and marketing challenges it is certain to face in the next 10 years.**



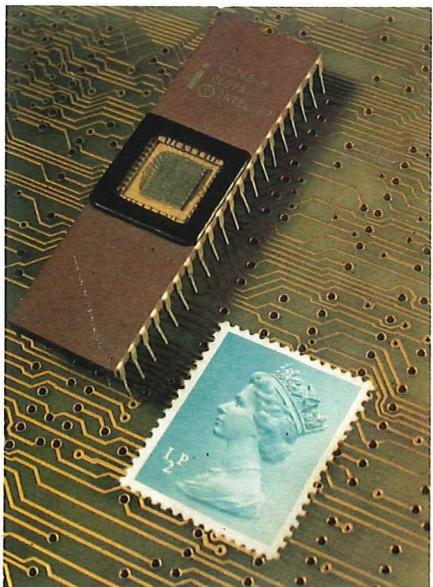
A receptionist uses the latest in private exchange equipment - Monarch 120.

in all the new markets that will open up, it will always lack the resources to do so. Success lies in picking winners and involving everyone in the Business in marketing its products.

The strategy set out in the new Business Plan is aimed at overcoming weaknesses in operations by focusing on the development of the network, quality of service and products and services. The network is at the heart of the Business and its development is the keystone of strategy for the 1980s and 1990s. All the Business' plans depend on modernising, expanding and exploiting the network and it will continue to dominate the investment

programme for the foreseeable future. In the United States there has been a significant increase in value-added network services (VANS) in which entrepreneurs lease lines from the carriers and provide extra facilities, or cut the cost to customers by making more efficient use of the capacity.

The response to this challenge must be to improve the Business's network facilities. By 1983, the Integrated Services Digital Network (ISDN) will provide switched digital channels working at 64 kbit/s from customer to customer. This will provide a comprehensive, economic and flexible range of voice, data, and visual telecommuni-



**At the heart of the revolution – the tiny silicon chip.**

cations services. And by 1986, 30 major conurbations will be linked by the ISDN.

But promises of a golden future are not enough. The whole network cannot be converted to ISDN overnight. Meanwhile a large part of the system is still based on old fashioned electro-mechanical technology which is all too prone to faults. The network must, therefore, be modernised and simultaneously the reliability of the electro-mechanical equipment still in service, must be improved.

The programme to replace Strowger local exchanges with TXE2, TXE4 and TXE 4A, and System X has been under way since 1972 and will be completed by 1992. Already, the first System X exchange is scheduled to go into service this summer. In all, about £3,500 million will be invested at today's prices in this programme. Some

Strowger exchanges will remain in service for sometime yet, although there are plans to replace the more fault-prone elements with electronic equipment. With these improvements, call failures due to the system should be reduced to 0.7 per cent by 1990 and transmission quality should also be dramatically improved by using fibres and other modern transmission systems.

But it is marketing which offers the greatest challenges and opportunities. Growth in established services, especially basic telephone service, will fall during the 1980s and it is planned to achieve high penetration of the market as quickly as possible. With increased emphasis on new developments, especially in the converging fields of telecommunications and computing technology, a wide range of new services and facilities will become possible as will new ways of carrying out or controlling office, manufacturing and other processes. In the home, there will be Prestel, other computing services and Alarms by Carrier (ABC alarms). Remote control techniques could allow distant control of heating or cooking and even meter readings over the telephone. The possibilities are endless.

For those who want telecommunications products and services and for suppliers who want to sell them, the Business will be improving and extending its range of equipment and services. This will start with the opening of telephone shops in major shopping areas later this year, together with improved training for local sales officers. Speedier provision of service is needed, perhaps helped by the use of plugs and sockets. There is a growing demand for 'fashion', special facility phones and other terminals.

At present there are 300,000 business customers who rent more than one line. They form a complex of market segments with very different characteristics, depending on size and type of business. It is here that there is the greatest potential for profitable growth in existing services. Detailed sector studies will lead to the introduction of new products, especially new PBXs such as the Herald business system and the Monarch 120 call-connect system. Alternative pricing packages will be developed, perhaps in conjunction with finance houses, to give cus-



**Head of section David Cheeseman with a voiceboard, an integral part of System X, the all-digital exchange system which is now being introduced.**



Phones of the future are here – just three examples of a proposed new range for both home and office.

tomers a range of payment options to suit their needs.

By next year it is proposed to open a service for communicating word-processors (probably of the teletex type), using the public telephone network. Other facilities and equipment soon to be on offer include answering machines and callmakers, database access systems such as Prestel, facsimile, audio-conferencing and slow-scan television. An Electronic Funds Transfer service is to start in 1983, opening the way to widespread use of such terminals in shops and banks by 1990. Other organisations, concerned with 'office of the future' developments, may undertake joint ventures with the Business to pool skills and knowledge.

Payphones too, are important both as a 'shop window' and as a facility for customers with their own telephones which, like radiopaging and radiophone, allows them to keep in touch while on the move. Various versions of the new microprocessor 'blue payphones' now on trial will, if successful, progressively replace all existing coinboxes in public call offices during the 1980s.

Even with these advanced systems, the role of the telephone operator will remain vital. There are plans to modernise the equipment used by operators and introduce new and

**The coil of optical fibre cable round Research Department technician Jan Harrison's neck carries as much telephone traffic as the drum of coaxial cable behind her. Optical fibres will carry more and more traffic in the years to come – on land and under the sea.**



profitable services. As modernisation proceeds, it should be possible to make the working environment better and improve productivity.

Although these changes will affect the Business's home market, its plans cover a wider field than just the national network. The explosive growth in international services over the last few years will continue to be of great financial importance, not only to the Business, but to the exporting community and the nation. In sustaining and developing international services it is hoped to attract multi-national companies and other international bodies to Britain where they will establish their communications centres. Using stored program control (SPC) gateway exchanges, fast signalling systems and better network management, the international services will continue to expand.

More specialised marketing activity will be needed in the International Executive and in the Regions, and overseas administrations will be helped to improve their services. More satellite routings as well as growth in submarine cable and perhaps microwave routes will also occur. Maritime services will continue to grow and will be vastly improved when maritime satellites are introduced around 1981. And with telegram services to be revitalised, every effort will be made to ensure that they cover their long-run avoidable costs.

These plans of course, depend on the flow of completed developments to the market and on the associated research effort which will aim at identifying and validating new opportunities before they are commercially developed. At the development stage strategy will be to draw on the resources and skills of industry, using the Business only when firms cannot, or will not, develop the products needed.

There are four key elements to future systems - microelectronics, software, new transmission media, and the convergence of telecommunications and data processing. The amazing growth in the complex circuitry possible on an integrated-circuit chip will have a profound effect on the nature of telecommunications equipment and it is here that the Business must remain highly competent in all circumstances.

Plans will fail however, unless efficient supply of plant and materials to the field can be guaranteed. Recent problems have shown that supplies can sometimes be unreliable, but a



Now on field trial, ACRE - Automatic Call Recording Equipment - can save millions of pounds in operating costs.

major improvement programme is now under way to ensure smooth deliveries to Telephone Areas. Factories Division will continue to play an important role in making and repairing specialist or obsolescent items and supplementing other sources of supply.

The Business stands to gain from a successful British telecommunications industry. As suppliers produce more and so reduce unit costs, the benefit of successful British products will be available to customers at least equaling what is available to others overseas. But there will still be times when shortages or market pressures will make it necessary to look to overseas suppliers for some equipment where there is no suitable British equivalent. The Business will not only help British manufacturers to produce products which will meet the needs of customers but will also continue to support their export efforts. In addition, the Overseas Liaison and Consultancy Service will assist other nations in modernising and improving their services.

Telecommunications is about technology, but depends on people. The success of these plans depends totally on the willingness and conviction of people in the Business. Progress with grades restructuring, and the establishment of British Telecom will create exciting opportunities.

Through providing good conditions of employment and establishing open

and effective communication, a climate should be created in which everyone can take a pride in the Business and identify with its achievements. A look will be taken at the existing consultative machinery with the unions, to see whether it can be better suited to the needs of the new Corporation.

Although the Business is capital-intensive, labour costs still account for about half total expenditure and will remain very important. Credibility as a business and the ability to finance development depends on improving productivity.

Although this lags behind some countries, the Business compares well with them at a similar stage in the growth of their systems. The challenge is to follow where they have led. The system should grow by 44 per cent over the next 10 years with overall staffing remaining broadly stable and with tariffs halving in real terms. The challenge is considerable but it must be met because a public service is ultimately judged by what it does for its customers and whether it gives value for money.

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*Mr A. V. Knight is the recently-appointed head of the business planning and corporate strategy division in THQ.*

*Mr R. Wernham is head of section in the same division.*

British Telecom Journal, Spring 1980.



Electrically powered vehicles have been on trial in the Telecommunications Business for some time. This one is at work in West London.

# The fuel economy drive

**The Telecommunications Business's motor transport fleet, with 48,000 vehicles and 7,000 motorised mechanical aids is possibly the largest single user of petrol and diesel fuel in Europe.** Vehicles with payloads up to and including those in the one ton range used about 11.5 million gallons of petrol in the last year and 3.5 million gallons of diesel were used by heavier vehicles.

According to the best information available, the present methods of extraction, and sources of hydrocarbon fuel will be of no use in about 30 years time. But it is not only for this reason that the Telecommunications Business is taking its fuel saving responsibilities very seriously: escalating fuel costs make a more economical approach a matter of some urgency.

To help tackle the problem, the combined resources of the Motor Transport Division in THQ, the Management Services and Sciences Department, other THQ divisions and regional representatives have been brought

together as a group to reinforce the efforts so far made by the MT Division. A representative of the Transport and Road Research Laboratory is also a member.

Meetings of this Fuel Economy Study Group (MTFESG) are held quarterly under the chairmanship of the Chief Motor Transport Officer and so far more than 50 different possibilities for saving fuel have been identified and discussed by the group.

All these ideas, and indeed any other method of fuel saving, can be brought together under the acronym DIDAS - D - Driver (behaviour), I - Indirect (methods), D - Direct (devices and methods), A - Alternatives (to petrol or diesel), S - Servicing. Irrespective of the impact any of the 50 different methods may have, it is doubtful if there is any better fuel saving device than the driver's right foot.

Articles in the press abound advising how to be more economical with fuel. Drivers are told not to accelerate harshly; not to overspeed in any gear;

**S B Scott**

not to keep the choke out too long.

They are also warned to anticipate events and avoid braking; to get into top gear as soon as engine and road conditions allow; to keep vehicle weight down as much as possible and to maintain correct tyre pressures.

The MTFESG has in fact brought all these points together and arranged for a 14-minute film to be produced called 'Driving for Economy'. It is hoped that as many as possible Telecommunications drivers will see the film this summer as part of a fuel economy 'training package'. If, as a result, every 7 cwt vehicle driver improves his vehicle's consumption by one mile per gallon, then about 150,000 gallons of petrol will be saved annually. Additionally, fuel consumption meters are being fitted to all Telecommunications driving instructor cars to indicate to trainees the effects of good - and bad - driving practices.

Indirect fuel-saving methods are



Telecommunications vehicles fuelled by liquid petroleum gas are on trial in the Leeds area. Here senior technician John Scott makes an adjustment to the gas regulator in one of them.

are the use of lower viscosity oils; thermostatic cooling fans for engines; restriction of performance and/or speed of vehicle type; petrol additives; and better fuel atomisation.

It is rare for any new device in the carburettor/ignition/fuel burning area to 'cost in' over the expected life of the vehicle type, but the THQ MT Division continues to test rigorously virtually any device which comes on to the market. Before anything new is applied to an operational vehicle it is tested on a closed test track to a test cycle specification. These initial tests decide if a closely controlled field trial should be mounted but unfortunately very few ideas reach this stage.

The 'costing in' calculation embraces all costs — initial purchase, fitting, maintenance needs and fuel — throughout the vehicle's life. All these figures are then converted to net present values. It is a fact, too, that with so many different cost aspects changing disproportionately, there is a continuing need to check to see whether devices and methods once rejected may be moving into a 'cost-justified' zone. At present the simplest, quickest and most productive area for savings remains in keeping unnecessary weight down and tyre pressures up, as recent Post Office test track efforts have indicated.

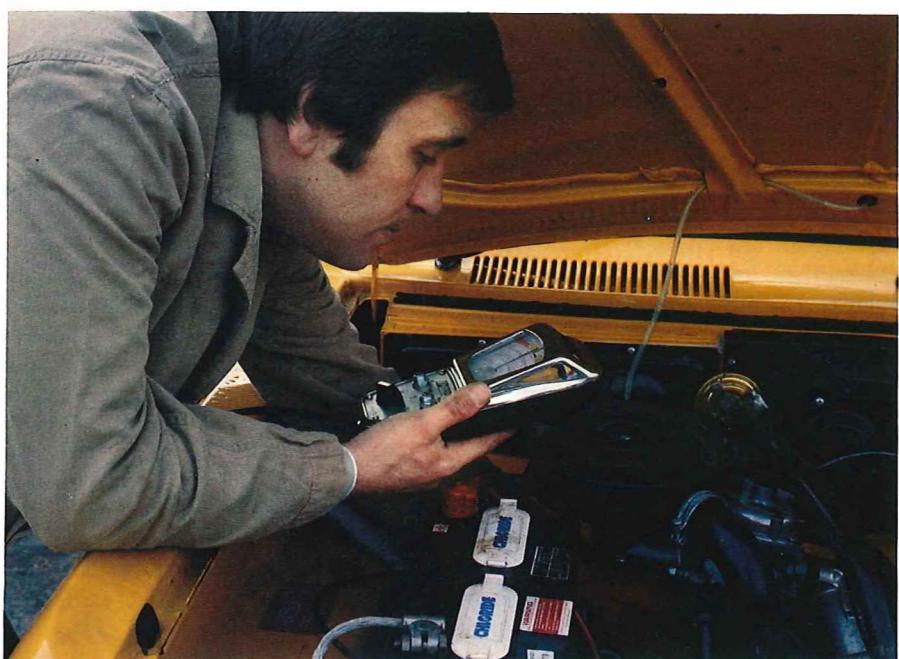
As for alternatives to the use of petrol and diesel, the Business is confining its main efforts to trials with

those not associated with the design or details of the engine or vehicle. 'Utilisation efficiency' is a term given to the emerging science by which the exact number of vehicles necessary for any occupational group is calculated. Vehicles are heavy users of fuel, money and resources, and the need to monitor the justification for current vehicle holdings, additional vehicle requirements and replacement has led to the introduction of the 'Motor Transport Capital Indicator'.

This Indicator compares a hypothetical fleet based on optimum vehicle type, and staff transport ratio for each occupational group, with the total vehicles actually in service in a Region or Area. For comparison purposes both the hypothetical fleet and the actual vehicle holdings are converted to 'standard' 7 cwt vans on the basis of relative annual charges. A figure of 1.0 is clearly the aim and such a ratio indicates sound capital investment in vehicles with satisfactory operational

mobility provision.

Direct methods of saving fuel provide a very fertile, interesting field. One of the most obvious areas is vehicle modification and includes, for instance, the use of lighter materials and different designs for bodies to reduce weight and drag. Other considerations



John Bellwood from THQ Motor Transport Division uses an exhaust gas analyser to check that the carburettor in a 7 cwt vehicle is set to give maximum fuel economy.

**Accurate monitoring of petrol consumption can be undertaken at a glance with this special 'test tube' equipment fitted behind the driver in this 7 cwt vehicle.**

electric vehicles, and the performance of its 150 liquid petroleum gas driven vehicles. The suitability of ethanol industrial alcohol or green petrol as an additive to petrol in Brazil to eke out consumption is being watched, as is the merging of methanol elsewhere with a proprietary catalyst to produce a high octane petrol. Both ideas however, need considerable development before either is available in Britain.

Development of the electric vehicle still depends on the lead acid battery as any other reliable source of portable direct current traction power appears to be several years distant. The weight of the battery is a big disadvantage and the feeder cable current requirements for charging produce problems when considering a suitable workshop from which the vehicles can operate. Maintenance complexity and costs, however, are likely to be less than with the internal combustion engine.

Vehicles fuelled by commercial propane at present offer the most likely alternative possibilities and following the exercise carried out on them four years ago many more aspects of their operational working and maintenance requirements are now being studied. Early results give good cause for optimism but the evaluation must necessarily be time consuming, particularly as roadside pumps containing the fuel are not yet plentiful.



All Telecommunications vehicles are covered by the MT maintenance scheme which, as well as keeping vehicles legally roadworthy, keeps them in good running order. Investigations are well advanced on fuel burning efficiency checks by measur-

ing the carbon monoxide (CO) content in exhaust gases, and a three per cent CO figure is considered the optimum for all ages of the most common 7 cwt vehicle type. Random gas analysis tests carried out this year in two Regions indicated that there was considerable scope for fuel savings by this approach.

Thus it can be seen there are many factors which can contribute towards greater transport fuel economy both within the Telecommunications Business and nationally. There needs to be great co-operation between all concerned and, even allowing for new inventions and techniques, it is inevitably the driver who still has one of the most vital parts to play.

**Leeds mechanic Alan Crawshaw checks the valves on the fuel tank on one of the liquid petroleum gas vehicles being used in the area.**



**Mr S. B. Scott is a head of section in the Network Executive's Motor Transport Division whose responsibilities include all aspects of fuel and vehicle economies.**

British Telecom Journal, Spring 1980.

# In a Scottish loch...

**R L Smith**

**Development of optical fibre cables for submarine systems has reached a milestone with the laying of a five nautical mile test loop in Loch Fyne, Inverary by Post Office cable ship 'Iris' for Standard Telephones and Cables Ltd.**

**A repeater on the five nautical mile test loop is carefully lowered into the waters of Loch Fyne from cableship 'Iris'.**

With the rapid increase in demand for international circuits, the capacity of submarine cable systems has jumped from just 120 circuits in 1962 to more than 4,000 – as in the UK to Netherlands 10 cable laid only last year. With a top frequency of 45 MHz these systems use repeaters (amplifying devices) every 2.5 nautical miles.

This increase in capacity has meant the use of larger cables to reduce attenuation at the higher frequencies involved and repeaters still have to be laid closer together than for earlier systems to ensure an acceptable signal-to-noise ratio. Indeed, when heavily-armoured cables are used, it is only possible to consider one more increase in capacity in the evolution of conventional systems because of the maintenance and operational problems involved. And in future, new cables must be compatible with the integrated digital network plans of most European administrations, as well as those of the UK and North America.

Against this background, the Telecommunications Business decided last year to begin its own development into submarine optical fibre cable systems. At about the same time a similar decision was taken by STC – the only UK manufacturer of submarine cables.

For undersea optical fibre digital systems to be economical compared with conventional analogue systems, repeater spacings must be greater than those in inland optical fibre systems which use an infra-red light wavelength of about 0.85 microns. One way to achieve economy is to use a longer wavelength where the loss of the glass fibre is less. To attain long spacing with wide bandwidth a mono-mode fibre construction has to be used. These two factors are expected to give repeater spacings of something in the region of 50 km.

Digital repeaters for optical systems work by using a photo-electric diode to convert light energy into electrical energy. The resulting digital signal is then regenerated to minimise distortion and jitter, and fed into the laser drive circuit for retransmission.

The whole process uses many more semi-conductors than conventional analogue repeaters and although optical fibre repeaters are more complex, the fact that they are spaced much further apart should give the systems a similar reliability requirement. The biggest problem is to find semi-conductors and electro-optic devices, detectors and lasers which can be shown to have reliability commensur-



The author demonstrates the difference in size between optical fibre cable (right) and its more conventional counterpart.

ate with the standards established for submarine cables.

A typical optical fibre cable would contain up to eight fibres. These are wound on a plastic covered steel support wire which is then sealed in an aluminium tube which protects the fibres from sea-bed pressure. A layer of steel wires gives the cable tensile strength and reinforces the tube. This is covered by a copper power feed conductor which is insulated by a layer of polyethylene. Total diameter is just under an inch.

Although such cable is designed for use in deep water, it would need a layer of protective armour wires if it

**Telecom staff at Inveraray pull one end of the cable loop ashore so that it can be connected to equipment in the nearby repeater station.**



were to be used in shallow water. And as well as being easier to handle, the small size of the optical cable allows more cable to be loaded on to cable ships than is the case with existing analogue systems.

The five nautical mile test loop of cable designed and manufactured by STC and laid in Loch Fyne at Inveraray carries six optical fibres, and has two constantan wires to monitor strain. Two of the optical fibres are of the mono-mode type, while the rest are graded index multi-mode. Also included is an empty repeater housing to enable cable terminations to the housing to be checked.

All the fibres were monitored while the cable was being laid and subsequently tested in greater detail by Post Office Research Centre staff from Martlesham and Standard Telecommunications Laboratory engineers. First results have indicated that the performance of the fibres has not changed significantly.

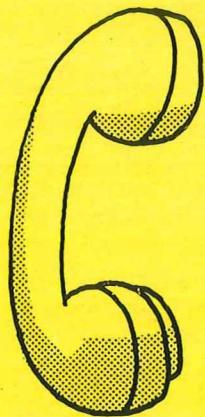
In terms of cost, first studies show that for systems of similar telephone channel capacity, those using optical fibres should be about three-quarters the cost of conventional analogue types. As optical technology evolves, the picture for submarine cable systems looks increasingly bright, providing there is continued progress towards the high reliability needed for economic viability.

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**Mr R. L. Smith is a head of group in the International Executive with responsibility for digital and optical fibre submarine cable systems.**

British Telecom Journal, Spring 1980.

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**AC Cox**

# Hello, this is your telephone talking...



**The use of stored program control telephone exchanges and the resulting development of new services has many obvious advantages for the customer. Human factors studies, however, have shown that the complexity of these services can be confusing.**

**The user of any technological system requires both a means of controlling the system and an indication of how the system has responded (feedback).** The telephone system meets these requirements by providing a dial or keypad to input commands and an earpiece through which auditory feedback can be sent. Thus, given the present uses of the telephone system, tones are a perfectly adequate means of informing the customer about the state of his call because only a few states are possible.

As well as the basic telephone service, however, there are a number of supplementary services available to customers such as the alarm call service. To use this, a customer has to contact an operator and detail his requirements – still relatively expensive.

With the introduction of the stored program control (SPC) telephone system during the 1980s many more supplementary services will become possible. Some of these will provide information, others will connect calls which under the present system would have encountered the engaged condition, while a third type will connect a caller to the person he wishes to speak to – even though that person is not at his home or office.

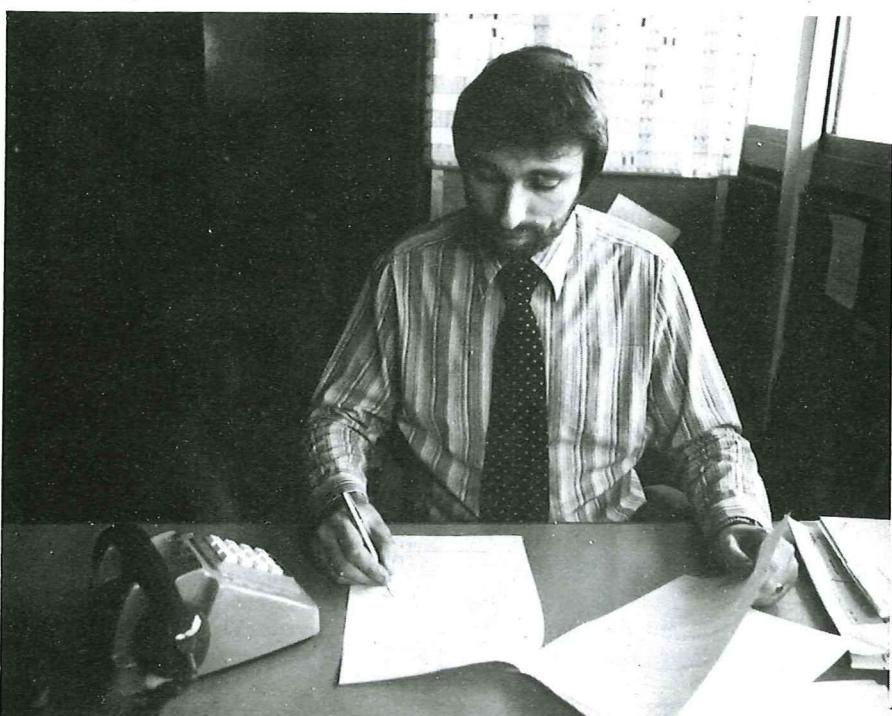
A more detailed description of some of the services likely to become available is given on page 18. These services are currently being implemented on an experimental exchange at the Post Office Research Centre at Martlesham. The SPC exchange, known as Pathfinder (see Telecommunications

Journal, Autumn 1977) serves about 100 staff at Martlesham and Ipswich but if fully equipped would be capable of serving up to 2,000 customers. The exchange has provided a tool with which to investigate supplementary services and, most importantly, it has enabled the type of problems which will be experienced by users of these services to come to light and be modified before introduction.

New supplementary services will be

accessed by special codes which have been standardised by the Conference of European Postal and Telecommunications Administrations (CEPT). These codes require the use of the standard ten digits plus two additional code digits. The activation codes begin with a star followed by the service code – a two-digit number which specifies a particular service. If supplementary information is to be included such as times or telephone numbers a

**Executive engineer Tony Richardson fills in a questionnaire prepared by the author in which 100 Martlesham staff linked to the Pathfinder exchange can give their impressions of the usefulness of the supplementary services and associated guidance announcements.**





Announcements are recorded on tape...

tional announcement machines were totally inadequate for this purpose and the need for what has become known as an Automatic Announcement Sub-system (AAS) was therefore established.

Announcements are currently used in the telephone network to provide information such as weather forecasts, bedtime stories and the time. Existing types of announcement system, however, have two major drawbacks. The first is that the customer does not always join an announcement at the beginning and secondly, announcements as presently produced, can only provide one piece of pre-determined information.

To overcome this, a system was designed and built which is able to give precise feedback to the caller with an announcement that always starts at the beginning. The method adopted uses cyclic speech store consisting of a large number of identical storage segments 'cycling' in synchronism. The appropriate segments can then be assembled as required to produce complete announcements. An additional advantage of dividing the speech up in this way is that it reduces the amount of speech that has to be held in store.

The AAS is able to cope with the need for both guidance and acknowledgement announcements. When the exchange receives the initial part of a supplementary service call it is able to decide which service is being used and whether additional information is required from the user. At this point it connects the announcement system. If more information is required, a guidance announcement is sent which informs the user which service he has activated and the type of additional information that the exchange expects him to provide. When the exchange decides that the information is complete it instructs the AAS to send an acknowledgement announcement which tells the customer how the exchange has responded.

Because of the way in which the announcements are put together it is possible to construct an announcement containing information specific to a particular user's requirements. In other words, for the first time, the telephone exchange is able to tell the customer exactly what it is attempting



... after which specially designed digital equipment is used to prepare speech segments for storage and future use by the announcement system.

on his behalf. For example, if the customer has booked an early morning call, the exchange will tell the customer that this is what he has done. But more importantly if an error has occurred, if for example, the customer misdialed the time of his alarm call – then the exchange will read back to the customer an incorrect time, and enable him to cancel this command and enter the correct instructions.

Although the use of announcements will reduce difficulties for customers, unfortunately they create other problems. Perhaps the most obvious is the fact that an announcement takes time. This period will not be a problem if the listener is interested in the information, but may become so if it is presenting what is to all intents and purposes redundant information. This latter state of affairs could exist if an experienced user of supplementary services was forced to listen to guidance announcements every time he used a particular service.

For this reason a number of methods of providing guidance announcements are being investigated. Each allows the user to choose whether to listen to the guidance provided. There are three guidance systems currently under consideration. The first, delayed guidance, only connects guidance announcements if the user pauses at certain points within the set-up procedure. The second is optional guidance. With this system the customer must indicate by a slight change to the code that he requires help in the form of a guidance announcement.

Finally, guidance can be provided by a system known as over-ridable guidance. In this case, the user is automatically connected to guidance at the appropriate points in the set-up procedure but should he decide he does not wish to listen to them he can continue to dial information and the announcement will be disconnected. The present AAS uses the human voice to provide its original input. It is possible however, that in future a 'synthetic' voice might prove more convenient, particularly if alternative methods of storing the announcements are adopted.

This, however, raises the whole question of what customers are likely to accept and there is evidence that people react less favourably to synthetic voices than to natural ones. On the other hand, the provision of a natural sounding voice has its problems. There are many anecdotes of people thanking the speaking clock

service or starting a conversation with a recorded announcement machine!

The fact is that the use of announcements will increase as the telephone system becomes more sophisticated and it is important meanwhile to study the situation closely so that when the telephone system 'talks' to

the customer he will clearly understand what it is saying.

*Mr A. C. Cox is an executive engineer at Research Department, Martlesham, with special responsibility for the human factors element of the Pathfinder trial.*

*British Telecom Journal, Spring 1980.*

## Services for the telephone customer of the 1980s

Short code dialling	— Allows the customer to associate a long telephone number with a short code thereby saving him the necessity of entering the full telephone number each time he wishes to make a call to that particular number.
Repeat last call	— Sets up a repeat attempt to the last telephone number that was dialled. This service is of particular benefit when a number is found to be engaged upon the first attempt.
Repeat last stored call	— Enables the number last dialled to be stored for later use, thereby enabling the user to dial other telephone numbers before making a repeat attempt at the stored call.
Alarm call	— Enables the customer to book a call to his own telephone at a specified time. The maturing call can then be used as a reminder or an alarm call.
Incoming calls barred	— Enables the customer to bar incoming calls to his telephone.
Outgoing calls barred	— Enables the customer to bar outgoing calls from his telephone.
Basic diversion service	— Diverts all incoming calls to another telephone.
No-reply diversion	— Diverts incoming calls to another telephone if the call remains unanswered for a specified period of time.
Engaged diversion	— Diverts incoming calls to another telephone if the called telephone is engaged.
Call waiting	— Provides a means of answering an incoming call when already engaged upon a call.
Three party service	— Enables the customer to set up a 3-way conversation on his telephone.
Remote control service	— Enables a customer to set up services on his telephone from any other telephone.

# On call nationwide

## PR Clark and NW Brown

Katie Boyle has one. Consultant surgeons and doctors find them indispensable. Disc jockeys use them and so do undertakers. They are also a hit with taxi drivers, airline pilots and model girls. What are they? They are Post Office radiopagers. And by the end of this year, a national system, which by 1982 will enable customers to keep in touch throughout the UK, will begin operating.

The Post Office entered the radiopaging market in February 1973 with the Thames Valley system which uses proprietary control equipment and pagers. From this it soon became clear that paging was a service much appreciated and by December 1976 a second, larger terminal had been brought into service to provide coverage over Greater London. To exploit the market fully, the paging number capacity of the London equipment is being used to cater for some of the demand outside London before the national system comes into operation towards the end of this year. This is known as the 'Eight City Scheme'.

By remotely siting transmitters connected to the London computer by Tariff T circuits, the scheme had, by April this year, enabled service to be extended to Birmingham, Aberdeen, Manchester, Cardiff, Bristol, Glasgow and Liverpool. A specially-designed electronic switch permits selective paging in these areas – an important factor for national paging.

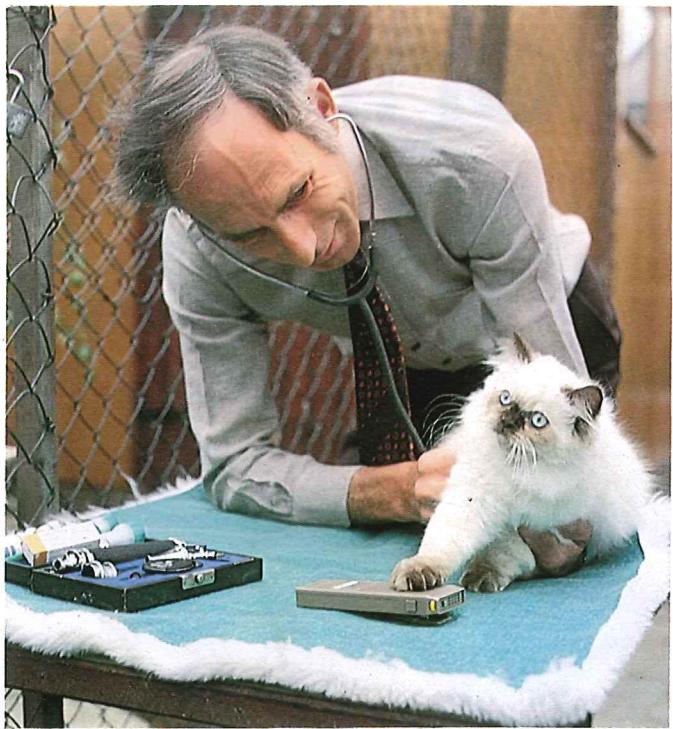
The plan has been to divide the country into 40 paging zones. Customers will select the zone, or zones in which they wish to be paged, paying an appropriate tariff for each. The control equipment will arrange for signals to be transmitted only within these zones, each one taking care of its own traffic. But because adjacent zones will not be transmitting identical batches of calls, a pager at the boundary of one zone may be confused by strong signals originating from other transmitters and could fail to respond to its own code. So a way of time sharing has to be introduced.



Television personality Katie Boyle is on the committee of Battersea Dog's Home and when visiting finds her radiopager an invaluable aid to keeping in touch.

Each zone will be designated 'A', 'B' or 'C' with no two similarly designated zones adjacent. 'A' zones – generally those with large populations – are allocated half the air time with 'B' and 'C' zones sharing the

remainder between them. By ensuring that every transmitter can switch between two radio channels, all zones can remain continuously active. While an 'A' zone is broadcasting for example on channel one for one minute, an



**Above:** While examining a rare Persian cat in its special pen, this Kent vet keeps his radiopager close by to keep in contact with his surgery.



**Above:** An industrial doctor who also has a private practice and is medical superintendent at a clinic needs his radiopager at all times.

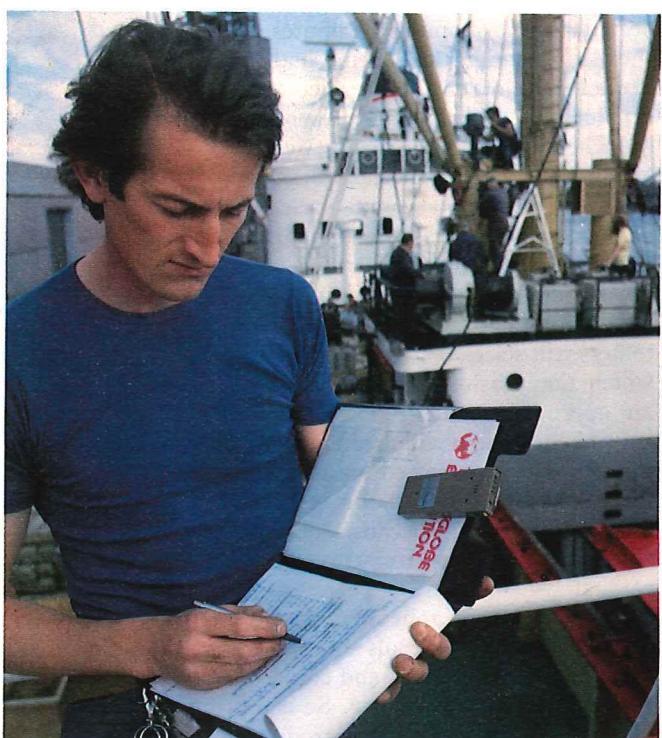
adjacent 'B' zone can transmit on channel two for half a minute, followed by zone 'C' for a further 30 seconds. During the next two-minute period, the zones change channels to provide continuity of service.

A system operating in this way clearly needs an advanced control system and sophisticated Paging Control Equipment (PCE) is at the heart of the national service. The first Post Office-designed and installed PCE will in fact become operational in August this year. Its initial function will be to take over the load of the existing London terminal while undergoing exhaustive

**Below:** Even on the golf course, radiopagers are ideal for those who need to be in constant touch.



**Below:** Radiopagers were an invaluable aid to members of the British Transglobe Expedition 1979/82 while organising equipment and supplies. Here one of the explorers checks items as they are loaded on board the supply ship.



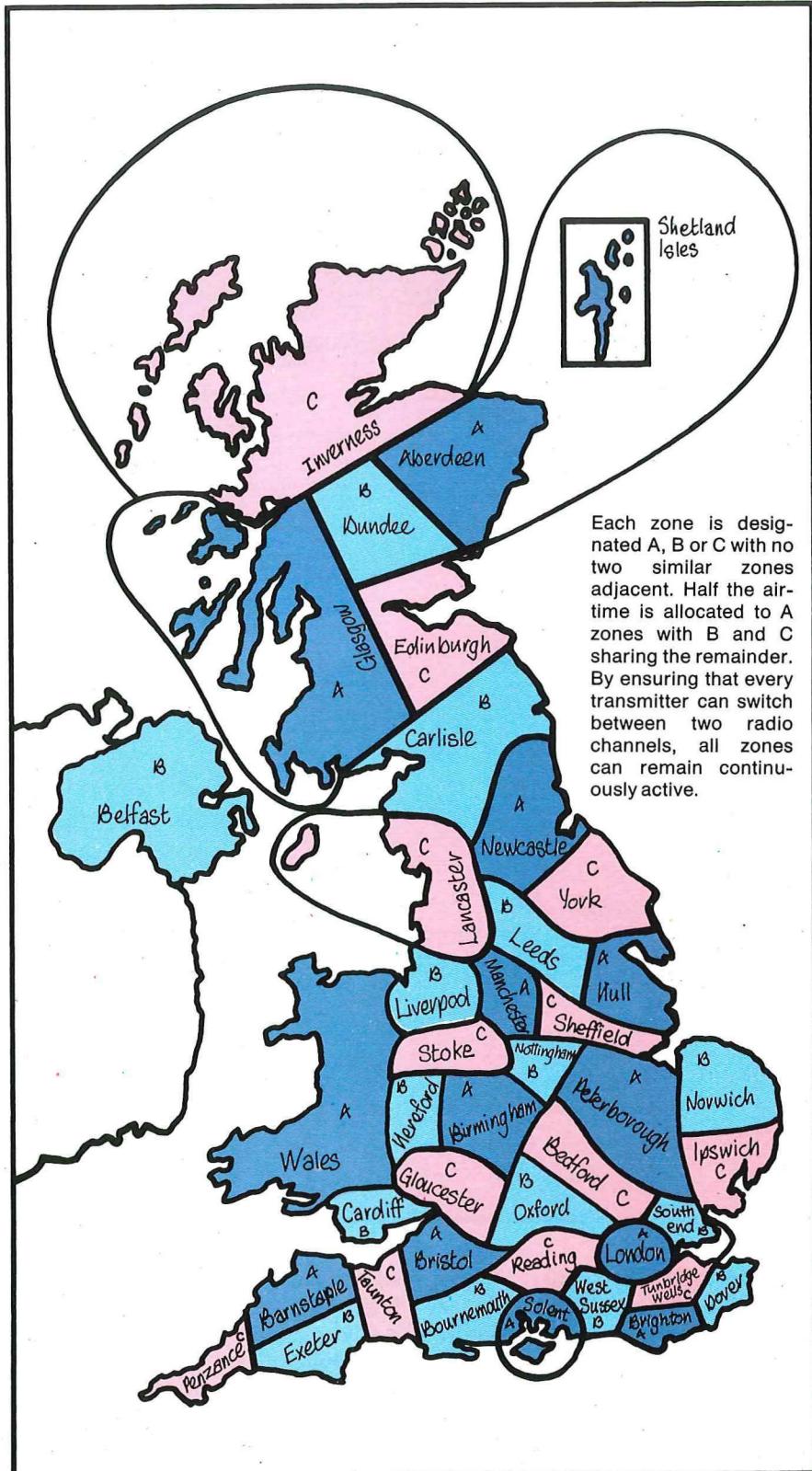
tests. Towards the end of the year, the second PCE will be interconnected, with another three following at three monthly intervals.

National coverage will proceed with the installation of Zone Transmitter Controllers (ZTCs) and base stations until the scheme is completed early in 1982. As the demand for paging develops, further PCEs will be added to the network. Fixing locations for the hundreds of transmitter base stations is a mammoth task. All Regions and Boards have been briefed on site selection and testing procedures and the work is progressing well. Nine radio-paging centres – one per Region – with sales staff in attendance and equipped with VDUs for updating customer information will be provided initially and they will be remotely located from the PCE.

Each PCE can serve up to eight zones via ZTCs in telephone exchanges or repeater stations close to the centre of each zone. Acting as branching devices, the ZTCs pass on paging calls from their parent PCE to the transmitters, which are specially-developed, all solid-state, two-channel versions of those used in London, providing 100 watts of power at VHF. Reliability of the service will be safeguarded through redundant, failsafe techniques applied to all parts of the system. From dual processors in the PCE, down to the transmitters, full duplication means that should a fault occur, service will continue on standby, thus reducing the chance of a failure.

The PCE is the 'brains' of the system. At the core is the Paging Control Processor (PCP) – two GEC 4070 mini-computers. The PCP has a 128 kbyte core store, a high-speed random access drum store of 4 Mbyte capacity and two 4.8 Mbyte cartridge discs. Telephone Line Interface Equipment (TLIE) on the input side and encoding equipment on the output side complete the installation.

Each paging number consists of ten digits – typically, 0073412345. The first digit '0' – tells the local exchange that the caller has dialled a national (STD) number. The next three digits (073) indicate a paging call. This is routed to the nearest PCE. The final six digits identify the home PCE as well as the pager itself and the call is switched to the home PCE via datel links for processing. The home PCE confirms that the number is valid, activates a recorded announcement which tells the caller that the paging request has been accepted and converts the paging number into binary form.



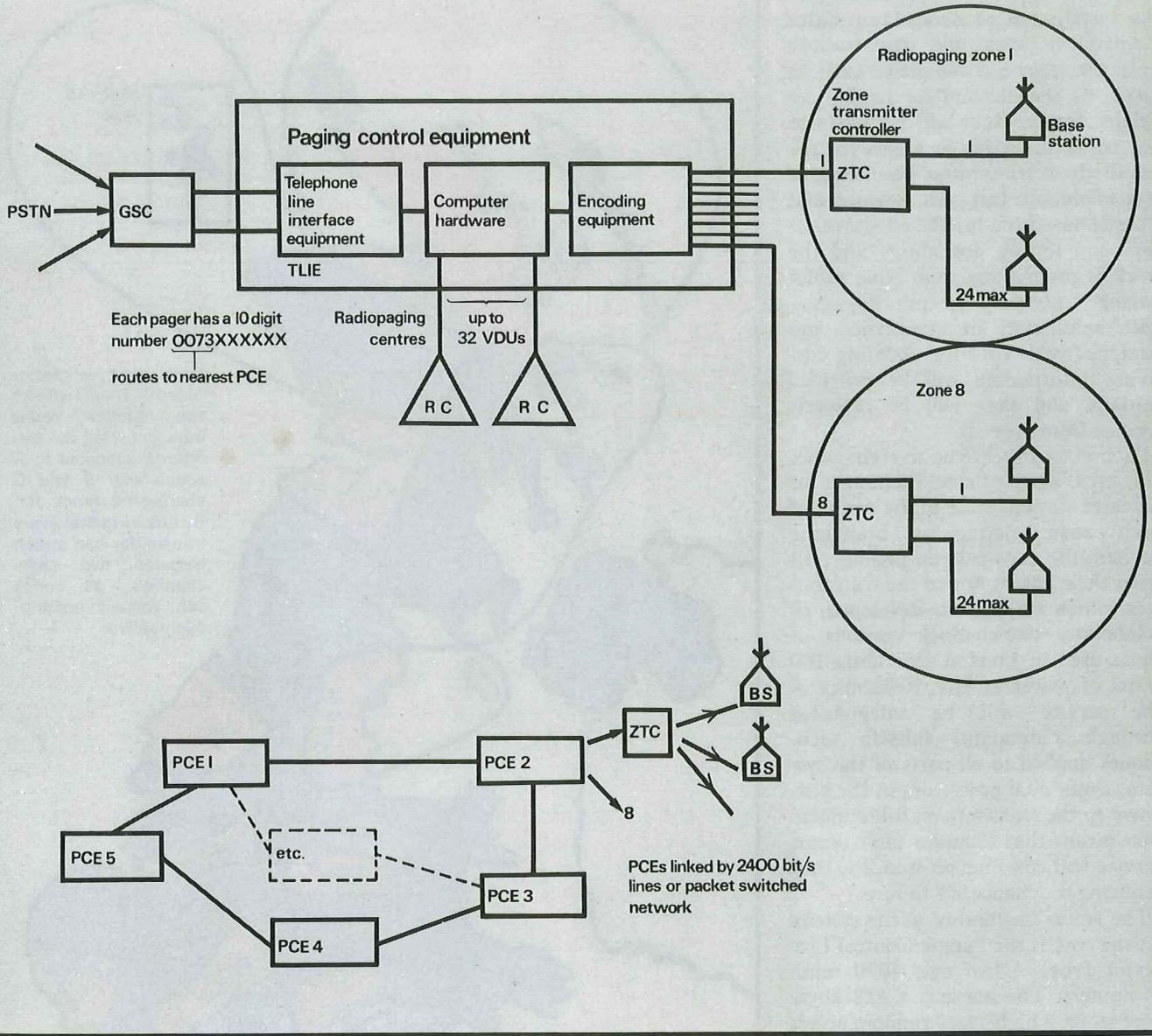
If the customer has the roaming facility and can be paged in a number of zones, this binary code is sent to the appropriate ZTCs via other PCEs. The ZTCs convert the binary code into a paging address appropriate to the pager to be called. Using frequency shift keying, a modulated standard carrier frequency is broadcast from all the zone transmitters simultaneously and is detected by all the pagers. Only

**Map showing proposed paging zones for the national system.**

the required pager, however, decodes its own unique code and emits an audible bleep tone.

Although the national system can accommodate up to eight different types of pager each with its own signalling code, the loss of transmission time when the PCE has to batch calls

## National radiopaging: system configuration



to groups of 'same make' pagers, switching to the appropriate code format each time has led to standardisation on a single code from 1981. Agreed with pager manufacturers, this new code, developed by the Post Office Code Standardisation Advisory Group (POCSAG), will enable different pagers to be used without code translation and it also allows pager decoding circuits to be standardised, reducing system and pager costs.

Its other advantages are that it has a capacity for eight million paging addresses, or two million pagers each with four addresses; it can convey messages for display on pagers equipped to receive them – an important factor for future developments, and a paging rate of up to 15 calls per

second can be used which is four times faster than the London system. There is a false call probability of better than 1 in 100,000,000 and finally, an inherent battery-saving capability which allows the main pager circuits to rest, only switching on when needed to respond to a call.

Should a pager become faulty, it can be replaced at any radiopaging centre while the customer waits, the transposition being made by a simple keyboard transaction. Similarly, changes in a user's facilities can be carried out. And since all records are stored within the PCE 'memory', the customer need not return his pager when only a facility change is required.

Currently, about 30,000 pagers are in service and the Business is poised at

the start of a 'bleeper boom'. Whether for the businessman on the move between meetings, the doctor relaxing on the golf course or the model resting between assignments, the benefits of paging are considerable. The system has built-in flexibility which can save money by saving time. Indeed, there is little doubt that British Telecom's new national service is a world leader.

**Mr P. R. Clark** is a senior sales superintendent in the Business Systems Department of the Marketing Executive responsible for sales promotion of radiopaging.

**Mr N. W. Brown** is a head of group in the same Department and is technical manager for the radiopaging service.

British Telecom Journal, Spring 1980

# Future plans for radio



## DJ Withers

Changes to the maritime radio services operating below 30 MHz and a large increase in the UHF bandwidth allocated for mobile services were, from the Post Office's point of view, two of the most significant results to emerge from the World Administrative Radio Conference (WARC) held recently in Geneva.

A record 2,000 delegates representing 142 member states attended the 10-week conference which was aimed at revising the parts of the Radio Regulations applicable to all radio services – and in particular, the whole of the international frequency allocation table. The conference looked at world-



Despite the increase in land-mobile allocations, fixed radio-relay systems between 1 and 40 GHz, of which this tower at Purdown is one, have not been greatly affected by decisions at the World Administrative Radio Conference.

wide demand to establish ways of making better use of the frequency spectrum and its far-reaching decisions will decide the future pattern to the end of the century.

The UK's 48-man delegation included nine Post Office staff. Other organisations represented were the Home Office, the Civil Aviation Authority, Cable and Wireless, BBC, IBA and the Science Research Council.

On the whole, the outcome for the UK and the Post Office was satisfactory, although an increase in the number and complexity of minority and national allocations in footnotes to the frequency allocation table will make future revision very difficult. Several issues were deferred for the series of specialist WARCS scheduled to meet over the next decade. The new Regulations as agreed by the conference

will take effect from 1 January 1982.

On the question of changes to the fixed and maritime services operating below 30 MHz, the Post Office asked for more bandwidths below 50 MHz for maritime services and was prepared to accept cuts in the corresponding fixed service allocations which are not widely used. For frequencies below 10 MHz, however, strong opposition from other countries to any reduction in the fixed service allocations prevented further improvements to the maritime service. But expansion was achieved at 4 and 8 MHz on a shared (primary) basis, and for frequencies above 10 MHz, increases in the exclusive maritime bands were agreed in line with the UK proposals.

As for increases in the VHF and UHF bandwidth allocated for mobile services, and in particular for land-

mobile, the conference decided on three new mobile allocations in the bands 41 to 68 MHz, 174 to 223 MHz and 862 to 960 MHz. In each case, they were to share with other services, chiefly broadcasting, but there was also general agreement among Western countries on the need to make use of these bands for the land-mobile service. This will be introduced stage-by-stage following the necessary planning conference. And the Mobile World Administrative Radio Conference, planned for 1982, may consider whether part of the new bandwidth can be allocated for maritime services.

Maritime satellite services also came in for changes. The Post Office agreed with an estimate from INMARSAT (the International Maritime Satellite Corporation) that at around 1,600 MHz, a bandwidth of 15 MHz was needed in

**The WARC 79 conference allocated new frequencies to meet the growth in land-mobile services such as radiophone.**





**Miss World, Gina Swainson, phones home to Bermuda in style via the Madley connection – part of the trans-global communications network discussed at Geneva.**

each direction between ships and satellites instead of the present 7.5 MHz. Also, a further 5 MHz for ship to satellite was needed for transmitting seismic data. WARC-79 agreed to these proposals, except for 1 MHz in each direction, but some parts of the new bandwidth will not become available until 1990.

The Post Office's objective for the fixed-satellite service for international

connections was to double to 1,000 MHz the bandwidth allocated for international services between 10 and 15 GHz, and to exclude totally the feeder links for broadcasting satellites from the up-link band. Bandwidth was increased, but broadcasting satellite feeder links were not excluded. Generous allowances, however, were made elsewhere for these feeder links and so they should not prove a serious

hindrance to international networks.

There was strong pressure to increase the bandwidth allocated to the fixed-satellite service near 4 and 6 GHz, despite the use already made of this part of the spectrum for other services, in particular, radiolocation. It was agreed to add 100 MHz of bandwidth for fixed satellites, available to all countries from 1982. A further 300 MHz will be made available for most countries, although not for the UK. Also, 200 MHz is to be transferred from radar to satellite use, although when is not yet clear. All this is beneficial to the International Telecommunications Satellite Organisation (INTELSAT) and the Post Office.

Below 1 GHz, the position of radio-relay systems will be made more difficult because of the increase in land-mobile allocations. Between 1 and 40 GHz, the fixed service has not been greatly affected, mainly because there is spare capacity in the top half of this range of frequencies which could be made available for the Post Office radio-relay services.

At higher frequencies (30 to 275 GHz) the outcome for the fixed satellite service was at least as good as the Post Office expected, although these higher bands are not likely to be used commercially for many years.

None of the previous World Administrative Radio Conferences had authority to allocate frequencies above 40 GHz for terrestrial services. WARC-79 made large allocations for the fixed service both in the atmospheric absorption bands and in the 'windows' and these should be suitable for both short range radio-relay systems and local distribution systems when the need arises.

Some countries were concerned that they would not find room in the geostationary orbit for domestic satellite systems planned to start in about 10 to 20 years' time. It was agreed to hold a conference around 1984/86 to discuss how access to the orbit and spectrum could be assured.

The new Radio Regulations will govern all the services using the frequencies of the radio spectrum until the end of the century. And WARC-79 proved there was no problem, however difficult and complex, which could not be resolved.

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***Mr D. J. Withers is deputy director, International Network, and led the Post Office contingent to Geneva last year.***

British Telecom Journal, Spring 1980.

# Focus on film

M Capon

**The focal point for film making in the Telecommunications Business is in the Marketing Executive's Publicity Division. This article looks at the changing attitude of managers to the use of film and video tape for staff information and education.**

**Although the Film and Exhibition Group is currently spending much of its time in producing exhibition stands both at home and abroad, a vital role continues to be played by the film section, responsible for creative control or visual presentations both to and for the Business.** This can take a number of forms – ranging from slide presentations to specially-produced video tapes on a host of subjects.

One attraction of film for anyone

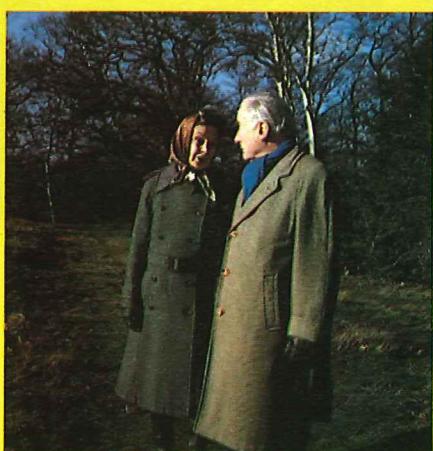
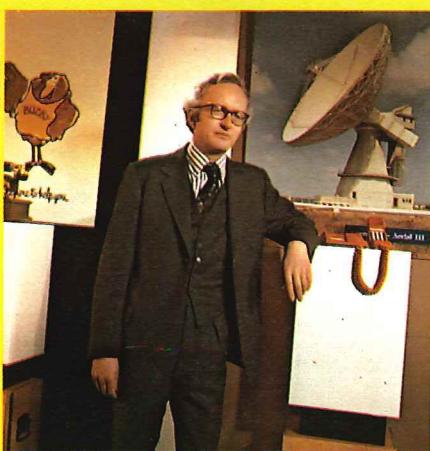
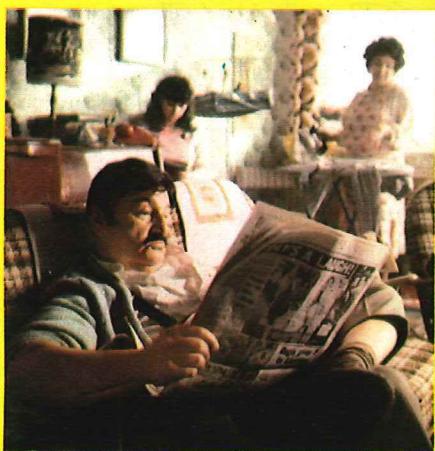
sary professional skill. Its long history in film-making goes back to 1933, when the Treasury agreed to transfer the Empire Marketing Board film unit to the Post Office. This pioneer unit produced 40 documentary and industrial films in the first three years, and led the field in the UK in the exploration and development of the medium as a means of public relations communication.

Shortly before the outbreak of war in 1939, the efforts of the film unit were

over production control for all media. This continued until 1969, when the Post Office became a public corporation. Responsibility fell on the Publicity Division in Marketing Department where it remains and now forms part of the Marketing Executive.

Films for the Telecommunications Business may be produced in one of two ways. They may either be contracted out of the film section to a commercial production company, or may use the resources of the Post Office Film Unit, based in the Procurement Executive. This film unit, which works with outside professional writer-directors and under the production control of the Marketing Executive's film section, is staffed by people with wide film-making experience. This collective expertise ensures that the right information gets to the right people in the right way – and at the right price.

Cost is a vital factor in presenting a visual image. The initial production cost is almost always offset by the versatility and durability of the finished product. For example, in 1978, the section produced 'A time to look forward', a 22-minute film about preparation for retirement. Although primarily made for the Business, the demand from outside organisations wanting to hire or purchase prints of the film was so great that within 13 months the film had paid for itself.



Stills taken from a selection of some of the latest Telecom films.

who has to convey information to a selected group of people is its ability, properly used, to guide and control the emotional responses of a receptive audience. It is of prime importance that such a powerful tool is not abused, and this requires the application of integrity and professional experience to ensure that it is not.

Happily, over the years, the Post Office has not been short of this neces-

directed into ARP and propaganda productions, and subsequently the unit was taken over by the Ministry of Information. The name also changed, and the team became known as the Crown Film Unit. From 1945 through to 1961, the Central Office of Information handled film production for the then GPO, by which time it was decided that the Post Office's Public Relations Department would take

But why produce a film in the first place? Often, because it is part of a multi-media campaign aimed at getting a particular message across. Senior management is becoming more aware of the value of the visual media in communicating their policies and plans to staff. This is particularly the case with the increasing use of video equipment. For an outlay of around £1,500, Telephone Areas have the

means to project visual messages to selected groups of staff. Subjects which lend themselves to presentation on film include safety, catering, fire prevention, instructional training, and internal communications.

Currently, 15 films are being prepared and a further 15 television commercials are under way. In the case of commercials, the film section works closely with the advertising agency to a Post Office contract. The production company uses a story board provided by the agency and on average, an animated Buzby commercial takes three to four months to complete.

The film section must, at an early stage, decide with the client which of the visual media to use. Often, a film will support written information in the form of leaflets or brochures, which may be distributed beforehand or may be handed out after the audience has seen the film. For smaller audiences, a video cassette may be the answer. Video is often easier to use than film, because television can be seen in ambient lighting.

Audiences too, are conditioned to receiving information by television, and are therefore receptive to this method of presentation. But for instructional use, film or video cannot replace written instructions which are a permanent record. Film, however, can show many things which cannot be demonstrated in a classroom — for

much more objective in the use of film as a selling medium. Greater subtlety in this approach, especially when launching a new product or series of products, means a more contented audience, and one which is more favourably disposed towards the company and its services. Increasing competition for markets and customers' disposable income demands greater sophistication in making the proposition to the prospective customer.

It is in this area that managers will be assessing the value of film in the future; they will need to be more aware of its potential power, and be able to differentiate between weak and strong approaches to the successful marketing of a good product.

Awards from festivals around the world adorn the walls of the group's new Seal House office in London — proof that films produced by the Business are second to none. With a history of fine film-making, and the years of expertise now resident in the films section, the challenges presented by the new video age are being met with conviction and confidence by everyone concerned.

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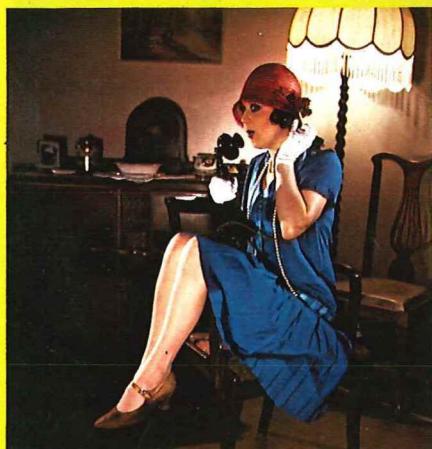
**Mr M. Capon** is the British Telecom Film Officer, and is based in the Publicity Division, part of the Marketing Executive.

British Telecom Journal, Spring 1980.

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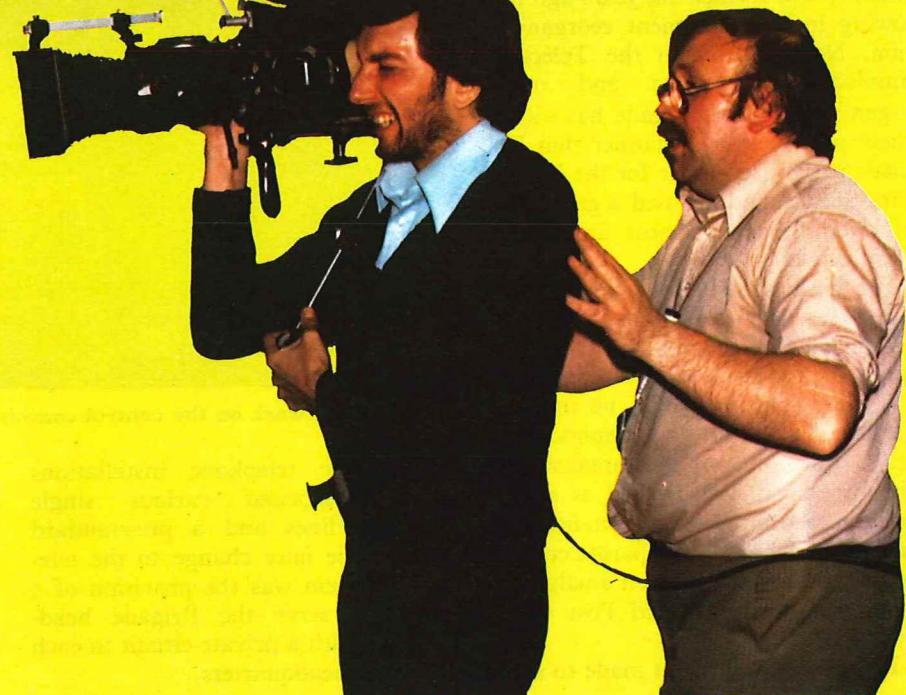
Films Officer Mike Capon (right) and assistant information officer Mike Medway edit their way through an in-house video presentation.



example, it can manipulate time to show in slow motion something which moves faster than the human eye can follow, or demonstrate the effect of a gas explosion in an underground plant which would be dangerous to stage in training schools.

In these inflationary days, films must have a clearly-defined purpose and give good prospects of a fair return on capital. Most companies are now

On location with the Procurement Executive-based film unit. Freelance director Ted Hooker points cameraman Bill Abbott in the right direction.





# Fire communications set the pace

**British Telecom staff from Manchester have played a leading role in the design and provision of new, computerised communications systems for the local fire service.**

## GTH Glover

Take eight fire services of varying size, add sizeable chunks from two others and accept that all operate different fire call-out methods ranging from basic locally-produced systems to others using much more sophisticated equipment. Next step: blend all these into a single fire fighting force with a unified call-out and communications system which will safeguard people and property in an area covering 500 square miles and housing 2.75 million people.

That was the problem facing the Greater Manchester Fire Service when it was formed six years ago following local government reorganisation. Now, thanks to the Telecommunications Business and other organisations, the Brigade has solved these problems in a manner that has made it the pace-setter for the British Fire Service and aroused a great deal of interest from overseas fire service administrations.

The basic structure of the Brigade comprises 41 fire stations, organised into five divisions, with a central headquarters. Early on it was agreed that the ideal solution would be to standardise the call-out and telephone systems. But this proved unrealistic at the time so it was decided as an interim measure to operate two fire control systems based on separate control rooms to be taken over on amalgamation using two standard Post Office systems.

There was no attempt made to stan-



**Operators at work on the control console at Brigade Headquarters.**

dardise the telephone installations which comprised various single exchange lines and a pre-standard PABX4. The only change to the telephone system was the provision of a PABX7 to serve the Brigade headquarters with a private circuit to each divisional headquarters.

These measures created a breathing space and allowed the Brigade to identify the call-out and communications problems that had to be overcome in the planning of the new control system. To this end, the Brigade set up a special project team to study their mobilisation and communication re-



uirements and Telecommunications staff were quickly involved.

Several areas for improvement were identified, most of which affected Telecommunications to a greater or lesser degree. The most important of these were the need for a more modern call-out system, better methods of terminating the large number of '999' emergency circuits, the provision of fire lines from high risk premises, and the standardisation of various telephone installations.

The one causing most concern was a new fire call-out system. The Telecom-

munications Business systems, although coping with the traffic created by almost 50,000 fire calls answered each year, were old in technological terms and offered no scope for future development. In the context of a centralised control room and to make the greatest use of available resources, it was decided that there should be total flexibility between operating positions so that any operator could answer any emergency call, mobilise any fire station and have access to all the mobilising information. The other basic system facilities

#### **Fire Brigade staff keep a watchful eye on the monitoring equipment.**



were teleprinter and public address call-out, line and equipment monitoring, running call facilities and station telephone signalling.

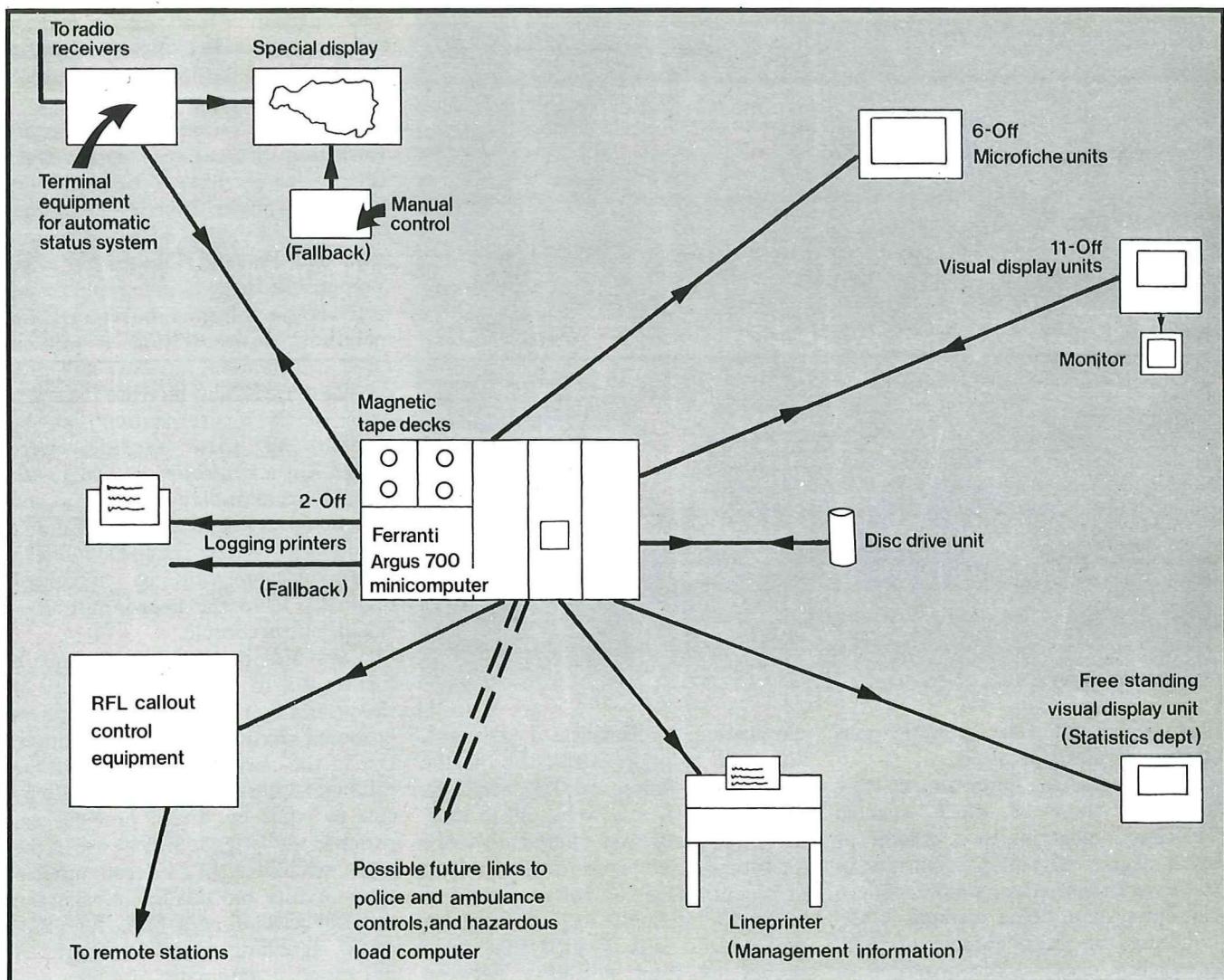
Telecommunications Headquarters Marketing Executive, North West Telecommunications Headquarters and Manchester North Telephone Area worked closely with the project team and Ferranti Limited provided computer facilities to give rapid access to the status information required for mobilising a fire station as well as rapid information retrieval and processing to assist and increase the speed with which a fire station can be alerted. All these facilities were centred on a control room fitted with only 11 visual display units (vdus) and one monitor. To offset the possibility of computer failure, the fire stations in each division can be mobilised manually from the appropriate divisional control console.

It was also decided to introduce a further aid to the overall security of the system by renting two alternatively-routed circuits to each fire station. One of the circuits would carry all the call-out facilities with the second circuit as stand-by. From previous experience the Brigade was aware of the high reliability of Telecommunications circuits and this led to using the stand-by circuit as a basis for automatic signalling speech network. A full range of automatic telephone services was provided for Brigade Headquarters, including tandem switching facilities with access to and from divisional headquarters and fire stations.

To enable switching under fault conditions of the main stand-by circuits, local area engineering staff designed the necessary switching units. Each circuit in the network carries a monitoring signal. If this is interrupted by a fault the unit switch operates automatically at the fire station and a fault alarm alerts the operator at the control console who will then manually switch to the designated stand-by.

Telecommunications maintenance procedures have been stored in the computer along with all installation details and maintenance priority is accorded to each circuit. Each operator has all incoming emergency lines and private wire fire telephones, together with outgoing communication facilities, presented at the position on the new Telecommunications push-button AD 9000 Keyboard System which can accommodate up to 70 speech circuits.

All control activity is channelled through the vdu keyboard which is



A diagram showing how the system works.

the method of sending and receiving information via the computer, and this is accommodated in a room below the main control room. The radio network also feeds data to the computer by means of data transmission units fitted in all mobiles on the radio scheme. As a result, updated information is available on request through the VDU to any operator on all fires. The system is very simple to use and experienced control staff very quickly become familiar with the full range of facilities it offers.

To follow through the sequence of receiving a fire call the operator enters a code on the keyboard and the format is immediately presented allowing details of the call being received to be typed on to the screen. This can be done in random order so that receipt of a town name before the street can easily be accommodated.

On entry to the computer a search of some 60,000 streets is carried out, immediately providing the operator with the correct pre-determined attend-

ance, a dedicated map reference, any special notes associated with that street – special risks such as, radiation hazards – and the nearest, and most available pump appliances.

Additionally, it displays an appropriate microfiche page of information listing up to 20 pumps and automatically records the date, time, serial number and operator position received at on a log page which has now been opened for that particular call. The operator then selects the resources he or she wishes to send by simply pressing keys and their call signs.

As the computer knows where all the call signs are at any time the appropriate stations are alerted automatically and the original message is printed out at the stations so alerted. The speed of the print-out is 30 characters per second which processes a turn-out instruction in less than five seconds.

Inbuilt reminder systems constantly monitor the proceedings to ensure that a response is made and that respective

appliances ordered are mobilised: it will not, for example, let an operator mobilise a resource that is already committed or is not available.

A main feature of the system design is the elimination of operator error. Calls cannot be overlooked and failure to mobilise a resource to an incident, for any reason, is quickly identified. In addition to the computer's operational abilities, it is also able to produce all the management statistical information normally required for both local and national returns.

The new system has been operational for several months now and the improved facilities have placed the Greater Manchester Fire Service in the forefront of other services throughout the United Kingdom.

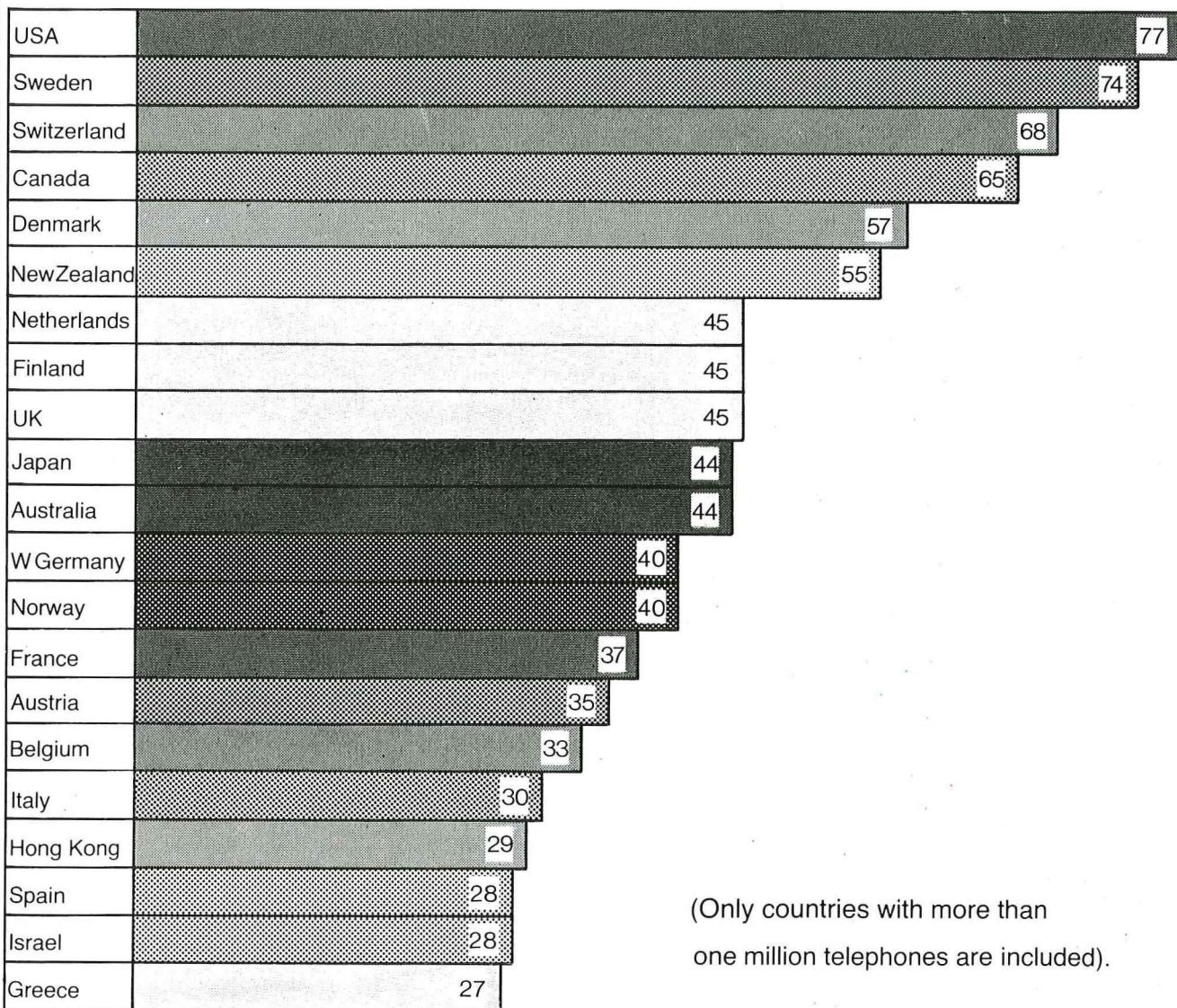
*Mr G. T. H. Glover was formerly Head of Sales Division in Manchester North Telephone Area and was heavily involved in the development of the Fire Service system. He is now Regional Marketing Manager, NWTB.*

British Telecom Journal, Spring 1980.

# Making a fair comparison

Comparing telecommunications systems of overseas administrations with those of the UK is now an important and well-established procedure. This, the first in a series of articles about other countries' systems, examines some of the problems involved.

Countries with the highest number of telephones per 100 population at December 1978.



The need for the British Telecom to compare its efficiency and productivity with similar overseas telecommunications organisations has long

been recognised by the Business and this view was reinforced by the Carter Committee Report in 1977. One of the more obvious reasons is the

need to answer, with informed responses, questions from customers returning from trips abroad. But also, by examining organisations



# THE WORLD OF TELECOMMUNICATIONS

operating under similar conditions, it is possible to judge whether the Business is making the best use of its own resources and by studying countries using different or more advanced technology, judgments on the effects of introducing such technology into the UK can be made. "Soundly-based comparisons," said the Carter Report, "would represent one of the few objective yardsticks of whether as a nation we are getting as good value from our Post Office as we are entitled to expect."

To compare the efficient use of resources it is necessary to look at a number of factors together to see how they interact. Put simply, they fall into two broad categories – quality of service and productivity.

Quality of service can be divided into five main areas: range of services offered; quality of the automatic service; fault incidence and repair; inland operator services; and quality of provision of service. Great care must be taken when examining foreign quality of service figures to ensure that the definitions match one another and that measurements are made in similar ways or that compensations are made for differences. The second category – productivity – is looked at here as a simple measurement of telephones or calls per head of staff. In looking at overseas administrations, even such a simplistic approach means studying the organisation and how its structure compares with that of the UK; staff numbers and development; the system size and usage; and the different levels of technology employed by each organisation.

Productivity comparisons are made particularly difficult by wide variations in organisational structure. One of the most common is that in many countries, especially in Europe, there are joint ministries of posts and telecommunications, and separate staff figures for each function are not always available. On the other hand, in Denmark and Italy, there are several operating companies so that a national view can only be obtained by aggregating the staff numbers. Also in many countries, work which in the UK is carried out by Post Office staff, may be put out to contract and this results

in further adjustments necessary if a fair comparison is to be made.

Tariff levels and financial performance are other areas which reflect quality of service and productivity. Although not a completely reliable measure of efficiency, the relativities of tariff levels can be of some value and for this reason are widely used by manufacturers, administrations, the press, individuals and consumer organisations. But such comparisons provide pitfalls for the unwary. A common cry is that in North America all local calls are free: past experience shows that little is free in telecommunications and that low costs for some services are almost inevitably balanced by higher costs for others.

In making tariff comparisons, attempts are made wherever possible to consider the intricacies of different countries' tariff policies and charging structures. For the past two years, the Post Office Report and Accounts has included a tariff comparison to show the cost of the telephone service in a handful of countries. These are based on 10 per cent of the connection fee, annual rental and typical call usage for a single line business user and a single line residential subscriber. They are then priced in the tariffs and currencies of other administrations and converted to sterling.

If tariff comparisons cause difficulties, then so do financial comparisons. Variations in accounting practices, depreciation policies, investment plans, government subsidy and even government interference all make it difficult to account fully for the differences in financial performance. Difficulties faced in making financial and tariff comparisons are compounded by problems with monetary exchange rates. How should foreign currencies best be converted to sterling? Should ordinary exchange rates be used, subject as they are to significant short-term variations as a result of changes in international confidence? Should gold francs be used or indeed, should sterling be forgotten altogether?

In an attempt to overcome these problems, a concept known as 'purchasing power parities' has been adopted. This method compares the

prices of 'shopping baskets' of goods and services between countries to produce new conversion rates which reflect more accurately the domestic price levels in those countries being compared.

Geographic, cultural, economic and political factors must also be taken into account because they have a significant influence on the rate and style of development of telecommunications as well as on the level of performance in any country.

How may countries be selected for comparison? What criteria are employed? It might be natural to select from those with the highest ratio of telephones to population because of the close connection between telephone penetration and national wealth. This is illustrated by the bar chart on the previous page which represents nearly 90 per cent of the world's telephones.

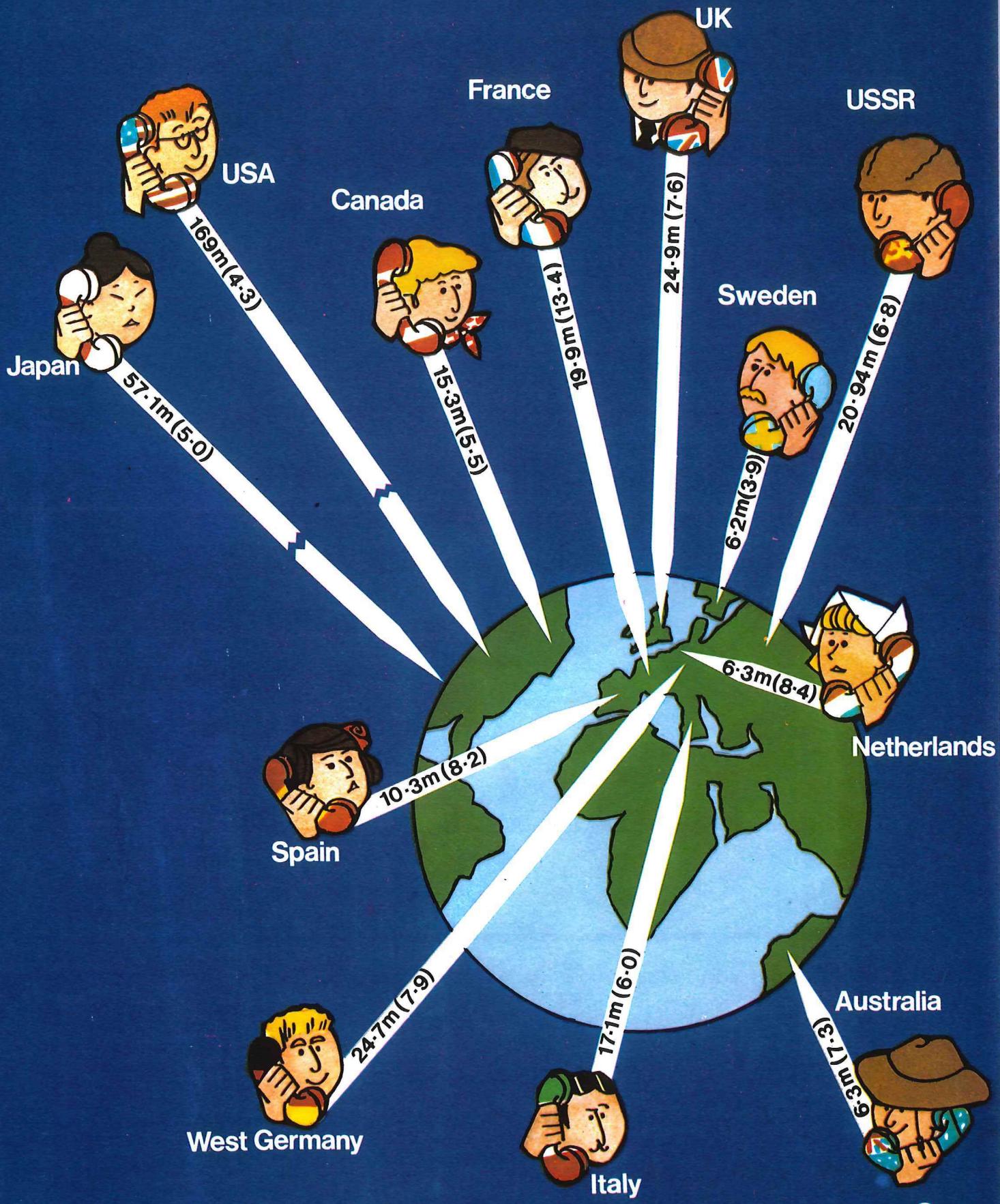
Countries with the highest penetration might be expected to have a combination of more advanced technology and more efficient administrations, and their experiences can be used as a test-bed for new technology, practices and policies. The Carter Committee took the view that the United States, Sweden and Japan are the market leaders in the provision of telecommunications services.

Equally, to make comparisons with the performance of other administrations, it is often useful to choose countries on a par with the UK. Ideally, they would have similar penetration, a similar system size and type of organisation, and operate in a similar geographic and economic climate. The two countries closest in these aspects are both in Europe – West Germany and France.

Differences can be just as informative as similarities and so countries which are well down the penetration league table but are developing rapidly are also of interest. Growth rates in these countries are likely to be very high and can be looked at, not just for their investment potential – another story – but in having large populations, they may soon become significant in world telecommunications. Among such countries are Brazil, with 5½ million telephones,

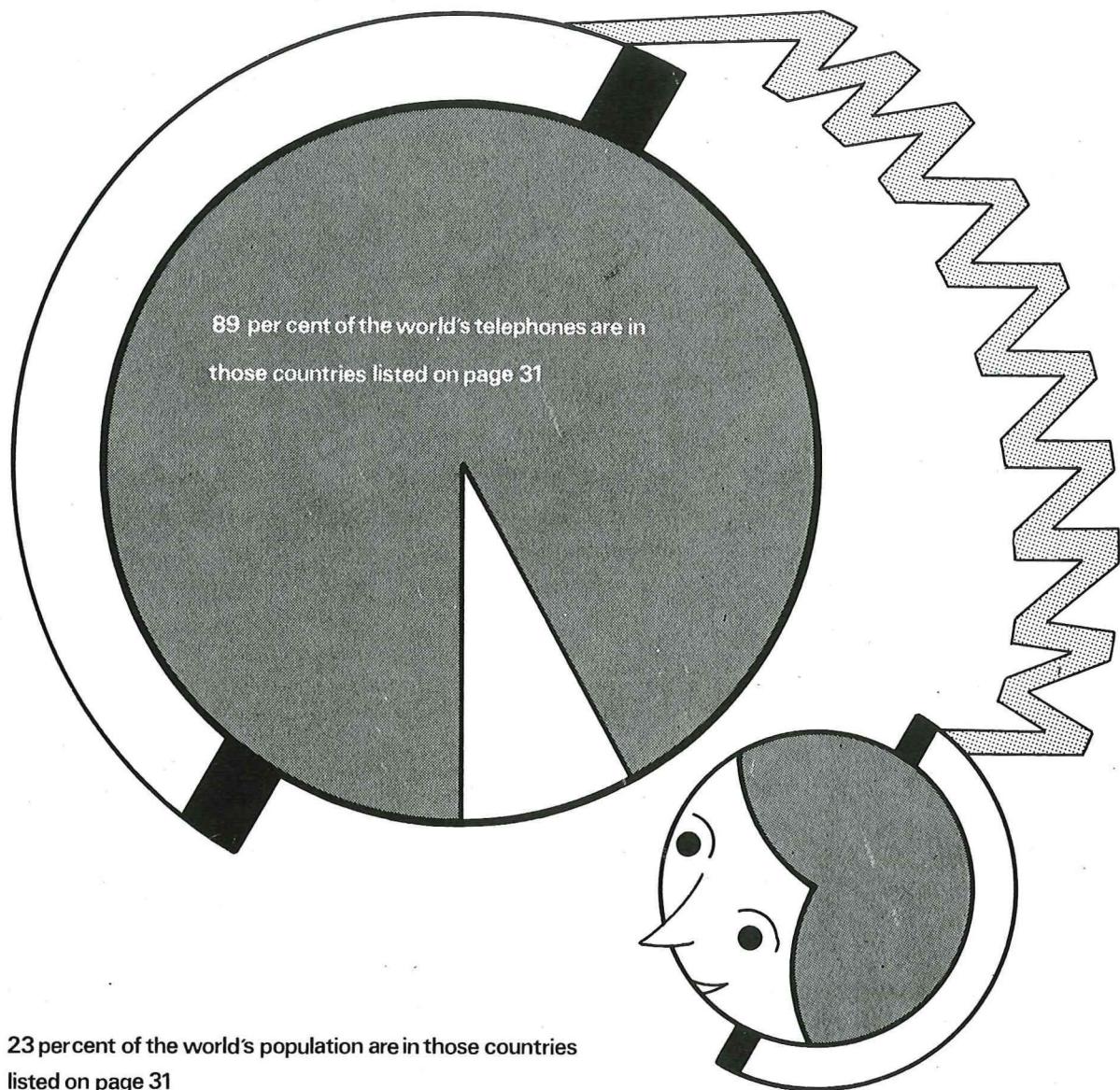
# Telephones around the world

Here is our annual international comparison of telecommunications statistics showing the 12 countries with the highest number of telephones at December 1978 together with the percentage growth (in brackets) during the year.



# THE WORLD OF TELECOMMUNICATIONS

## Telephones and people in the world



Source: ITU Yearbook of Common Carrier Telecommunications Statistics

and India which has about half that number.

Useful and lasting contacts have been developed with other administrations and information is exchanged on a fully reciprocal basis. However it is unusual for a wide range of quality of service figures to be published by other telecommunications administrations. The new publication 'Quality of Telephone Service', now made available by the Business may have opened a new era of willingness to give cus-

tomers the facts. The impending separation from Posts may increase public awareness that British Telecom is not just a national network but part of a fully-integrated world-wide system.

The authors are always pleased to hear from those with experience of other countries' operations and will acknowledge such help if it is used in future articles. Information may be forwarded to THQ/SP 1.2.3 at Leith House, 47-57 Gresham Street, London EC2V 7JL (01-432 3266).

**The authors** — *Mr O. P. Sellars, head of group; Mr J. J. E. Swaffield, senior telecommunications superintendent; Mr J. F. L. Stubbs, telecommunications traffic superintendent and Mr S. Lunt, executive officer* — are all members of the International Comparisons Group in the Service and Performance Department at THQ.

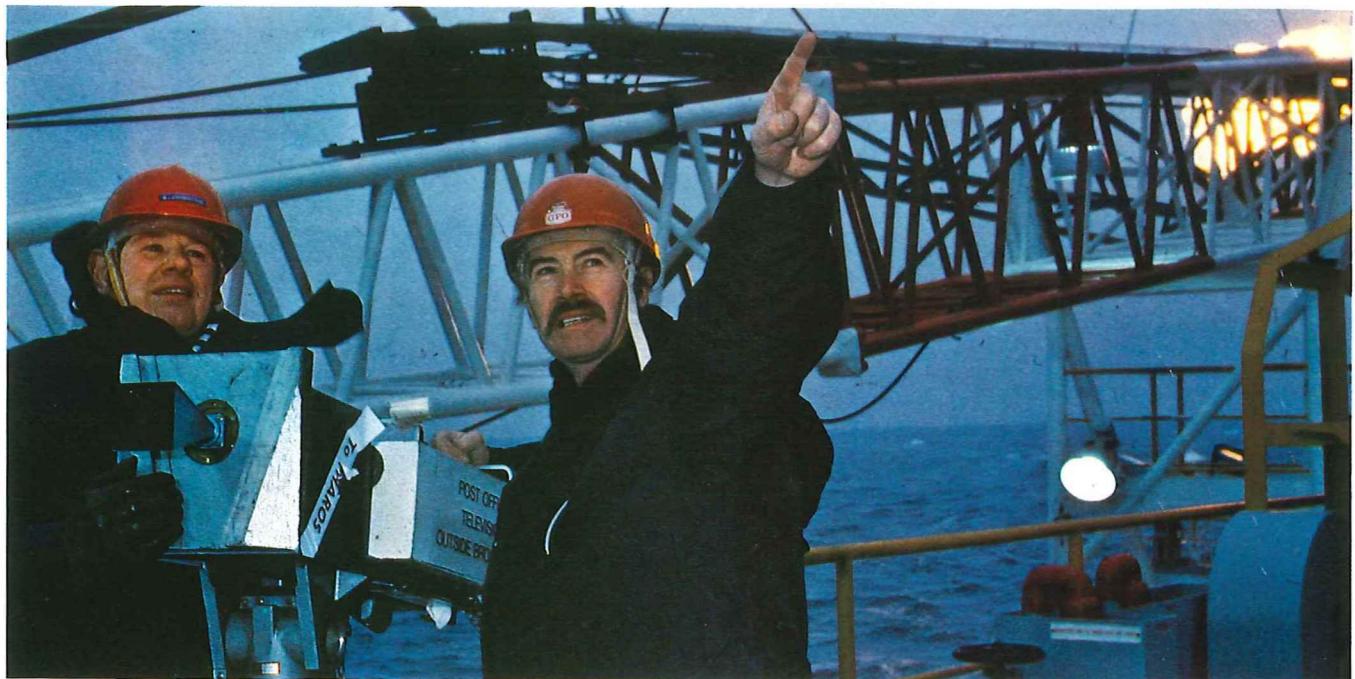
British Telecom Journal, Spring 1980

# North Sea links live by satellite .....



MSV Tharos ploughs through the North Sea to take up position next to the Piper platform 120 miles off Aberdeen.





George Johnstone (left) and Frank Sherry with the horn aerial which was used to broadcast live pictures from MSV Tharos in the middle of the North Sea.



#### **tion early in February – thanks to British Telecom.**

The link-up was used to broadcast HRH the Duke of Edinburgh's visit to Occidental Oil's £43 million emergency vessel MSV Tharos to audiences in a hotel near Aberdeen airport, and to staff in nearby company offices in Aberdeen.

With the help of Telecommunications engineers, the television signal was sent from the decks of the Tharos by Post Office microwave link to the nearby Occidental Piper field platform located 120 miles from the Scottish shoreline.

There the signal was connected to an IBA transmitter situated on Piper's helideck. The pictures were transmitted 22,500 miles out to the European OTS, and bounced back to an aerial at Goonhilly earth station in Cornwall. From there, signals went by landline to Aberdeen.

In the ballroom of the hotel, guests were able to follow the Duke's progress as he toured the Tharos. The two-hour live television presentation was hosted by Deputy Director of Post Office Public Relations, Ivor Mills at the hotel, and by Sandy Gall and Bob Southgate on the Tharos. The link-up was the first occasion that live colour television pictures with sound have

been broadcast via satellite from a North Sea installation.

Despite the vessel's high stability – she looks more like a rig than a ship – there were still problems in setting up the link. Weather conditions were producing wave swells of between 15 and 20 feet, which hampered preparations by the two British Telecom engineers on the vessel.

On Piper the IBA were using a new 2.5 metre transportable earth station to send signals to OTS. Mounted on a small four-wheel trailer, the antenna has an associated 14 GHz transmitter supplied by Marconi, and is housed in a metal cabin. The transmitter provides about 1.5 kW output from an air-cooled klystron amplifier. A wide-band modulator produces a 70 MHz modulated signal which is up-converted in two stages to 14 GHz.

The MSV Tharos is designed to provide fire fighting, emergency support, maintenance and diving facilities for

the Piper and Claymore oilfields in the North Sea. It has a specially-designed semi-submersible hull which has the advantages of a high stable working platform. Tharos has many advantages over conventional ships, which lie low in the water relative to most oil production installations, thus reducing the effectiveness of water cannon.

In the event of a platform evacuation, Tharos can keep in touch with the world from its own blast-proofed communications centre. Telephone, telex and data links carried by radio ensure that Tharos has constant communication at all times.

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British Telecom Journal, Spring 1980

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**Mr Ivor Mills, Post Office Deputy Director Public Relations, compères the presentation from an Aberdeen hotel.**



# The psychology factor

DP O'Donovan

**"Psychological what?" . . . Even 11 years on from the formation of the Central Headquarters-based Psychological Services Division, this puzzled response is still a common reaction.** Fortunately the Division's staff are able to use their own professional psychological training to avoid picking up an inferiority complex! More seriously, it is a fact that although the name is not really important, the work achieved is, and many staff come into contact with the results without even realising it.

So what is the Division's responsibility? Basically, its brief is to carry out projects and advise on anything involving the behavioural sciences. Recent surveys on staff wastage and morale have been two examples. The

Division has also given advice on analysing training needs, developing training techniques and evaluating training results – not always easy.

Much of its work deals with developing selection systems for open recruitment as well as for internal promotion competitions. For these, the Division not only constructs the tests and exercises, but also trains those responsible for running the systems – the test administrators and interviewers. A recent four-year study examined the effects of 'open reporting' in appraising technical staff.

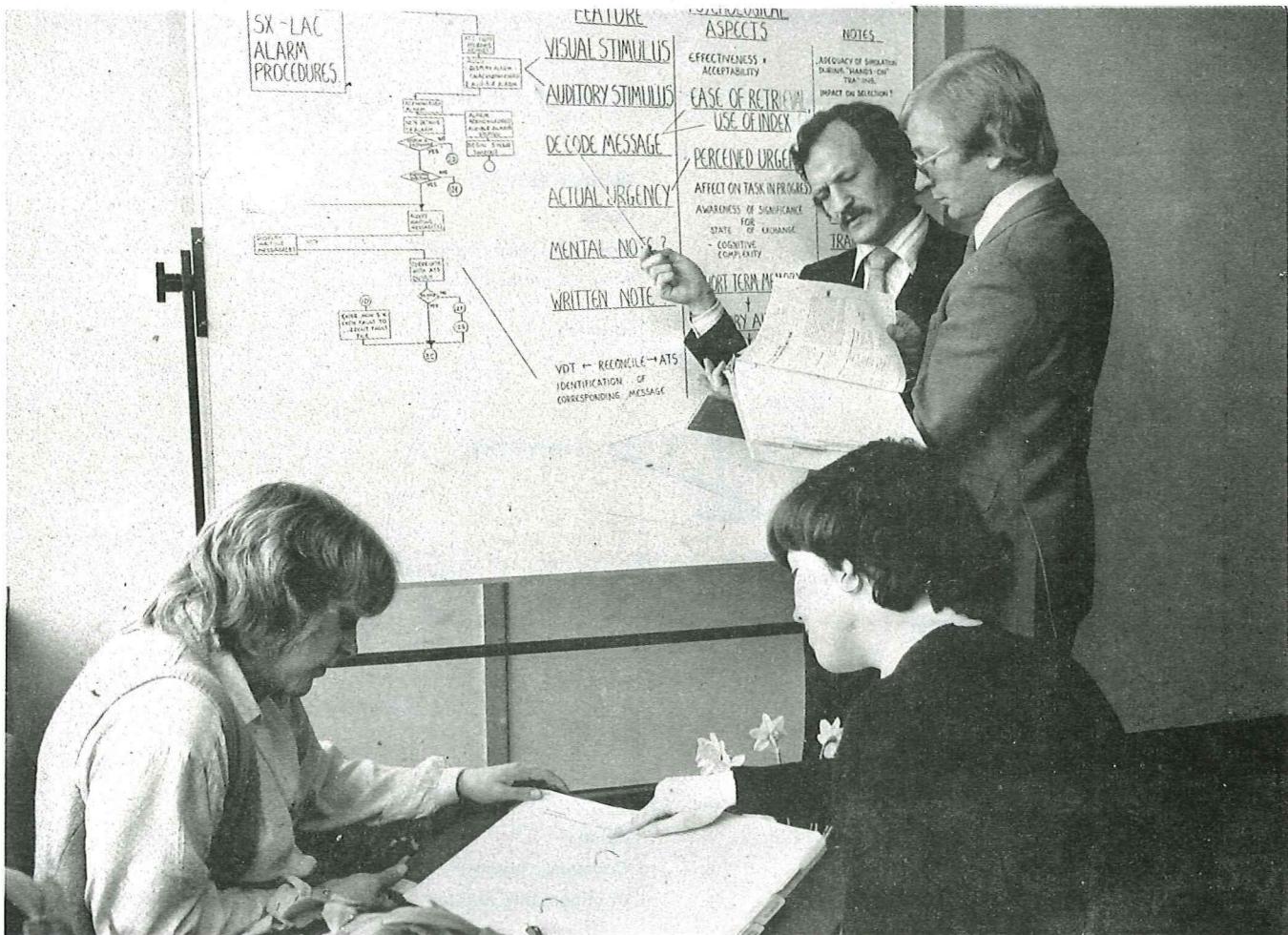
The old saying that the greatest asset in any business is the people within it has never been truer. Psychology is all about people – and occupational psychology is about people at work.

Already, much is known about the needs of people at work – what provides satisfaction or causes dissatisfaction – and how they can best learn and perform various functions.

The present is a challenging time for the Post Office, despite its already well-developed consultative procedures between management and unions. Many leading opinion-formers have already expressed concern at the

**Author of this article, Denis O'Donovan (nearest to board) works his way through likely responses to System X alarm procedures with Principal Bernard Stewart.**

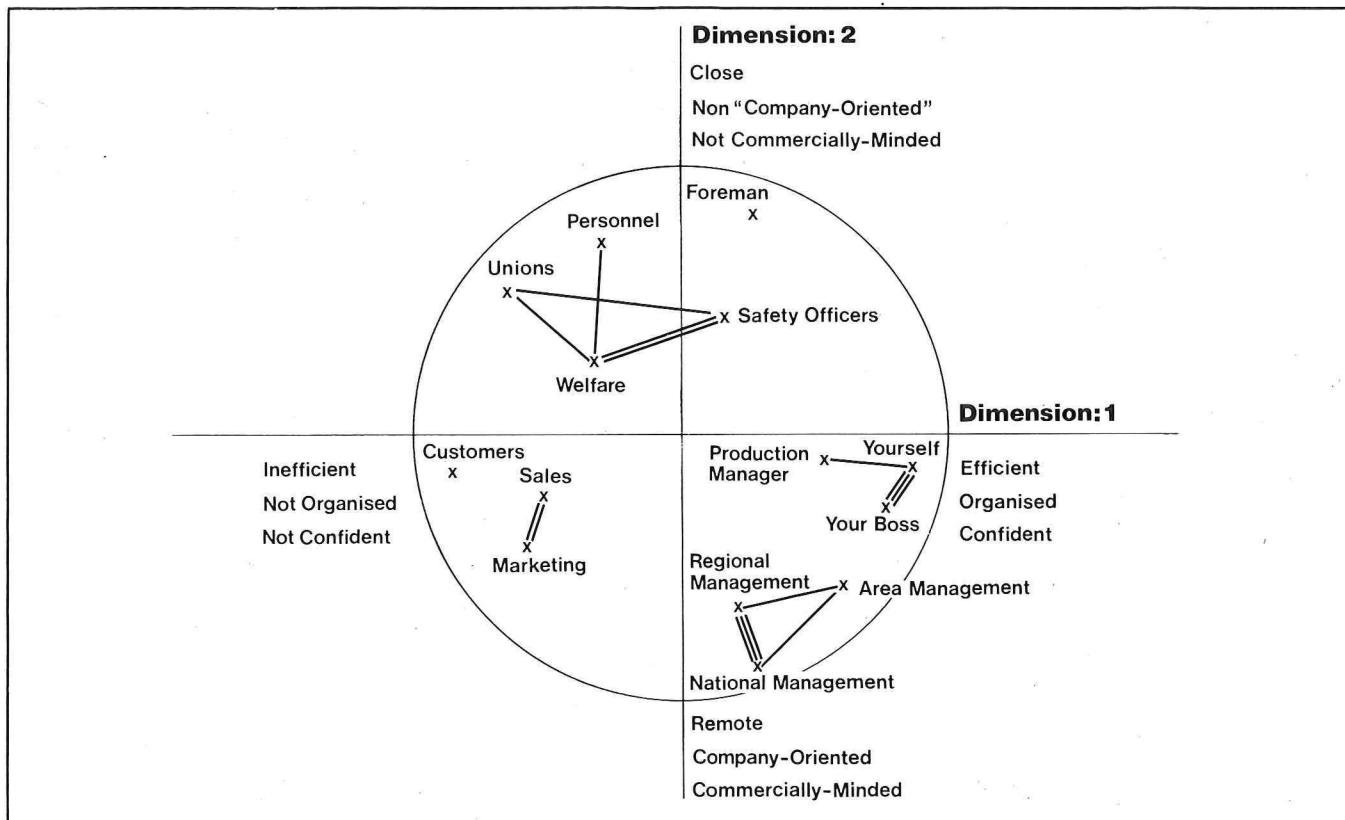
**Psychologists Jo Bygrave (left) and Avril Dale check another aspect of the same problem.**





Some deft knob twiddling soon tunes customers in to the complex world of hi-fi. But (right) it can often take longer to train staff to use similar equipment in a working environment.

An example of a 'cognitive map' used by Psychological Services staff so that they can understand an individual's mental picture of a given situation.



likely impact of the so-called microchip revolution and its effect on industry in general, and the communications business in particular. Although the picture is still not clear, the Division has even now started looking into some specific areas to get a better idea of what lies ahead.

With all this in mind, the Division has, for instance, kept in close touch with the groups involved in the design and use of System X equipment as well as with the Human Factors Division in Research Department, to see what changes in skills will be needed to operate and manage the new system. Naturally, as functions evolve and change, so do the selection criteria.

Indeed, the Telecommunications Business is rapidly facing a situation which calls for a whole new approach recognising that new technology will produce radically different job demands. And other factors, such as the impending legislation to create two new independent corporations out of the Post Office may result in changing business cultures and management styles of which existing staff have little or no experience.

In these circumstances, Psychological Services Division must first design

selection and promotion systems with in-built opportunities for people to show, both to themselves and to others, that they have the right skills for the new jobs, even if, naturally, they have not had any previous experience of them. Such selection systems should provide more than a simple pass or fail decision. They should also provide a feedback on how an individual should develop.

The environment in which people work and the equipment they may be expected to use may well affect the way jobs are designed. After all, there is a vast difference between designing equipment and then training people to work with it, and seeing how most people effectively perform a function and then building equipment which will help them to do it. Much thought, therefore, will have to be put into preventing people from becoming mere appendages to machines.

Given the right people, with the right skills, in the right jobs, many problems will be avoided. But that is not the end of the story. Uncertainty and unfamiliarity breeds worry and stress factors which strongly affect people's attitudes. Even in this area, there are still more questions than answers.

Why is it, for instance, that many find it easy to use electronic equipment in the home, such as a ten-program washing machine or complex stereo equipment, but have a mental block when it comes to coping with similar equipment at work? This raises a further question about the mental processes used in learning and carrying out tasks – for example, should communication between people and computers be based on computer logic or should the computer be taught to use our mental language?

So it can be seen that much of the work of the Psychological Services Division is aimed at solving real problems, often identified by groups of people within the Businesses, including management/union working parties. Working with the executive, clerical and secretarial staff within the Division, the psychologists give the Businesses what they need – a truly professional service.

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*Mr D. P. O'Donovan is Chief Psychologist to the Post Office.*

*British Telecom Journal, Spring 1980*

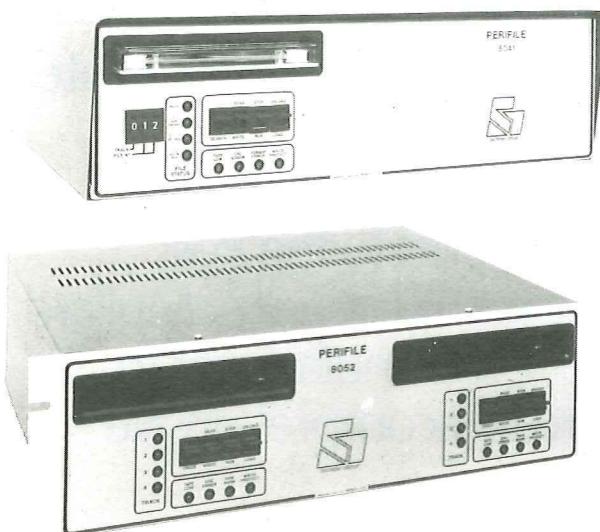
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# Perex Perifile data cartridge storage peripherals

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# Now P.O. approved plastic components from Mullard.

Mullard has been granted full Post Office D3006 approval for the supply of plastic-encapsulated integrated circuits.

A leading supplier of components to the Post Office for many years, Mullard is the first manufacturer to secure this comprehensive

approval which covers the use of plastic-encapsulated semiconductor components.

Application is also being made for D3007 approval covering equipment demanding longer component life expectancies such as electronic telephone exchanges.



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Mullard manufacture and market electronic components under the **Mullard**, **Philips** and **Signetics** brands.

# MISCELLANY

## System X on show

System X – British Telecom's all-electronic telephone exchange system – was on show to the British public for the first time at 'Communications 80', the major international communications exhibition held at the National Exhibition Centre, Birmingham in April.

As well as the new and exciting telephone facilities offered by System X, also on show for the first time was a new-style telephone – the first of a series of telephone products specially designed for use in conjunction with System X. Most distinctive feature is the position of the handset – on the left hand side of the phone with push-buttons or dial on the right.

Among other Post Office products on show were electronic pushbutton payphones, with microprocessors which work out the cost of a call and return unused coins; 'memory' phones, which automatically re-call a number that has been engaged or unanswered on a previous attempt, and can 'remember' 10 frequently-used or important numbers; aids for the handicapped, ranging from simple dials with large numerals for the poorly-sighted to

sophisticated units that will enable people who cannot move at all to use the phone and Prestel, the Post Office's viewdata system which links a telephone to a specially-adapted television to bring tens of thousands of facts and useful services into people's homes at the touch of a button.

## More vans on the way

A £15 million contract for 6,700 Bedford vans to be built at Vauxhall's Luton plant has been placed by the Post Office, one of Europe's largest transport fleet operators using 80,000 vehicles for its telecommunications and postal businesses.

The Vauxhall order is for 7 cwt HA vans. All the vehicles are for British Telecom and will be distributed to telephone areas throughout Britain. The first were delivered in May.

## Optical fibre chair

Britain's research into optical communications – a way of sending phone calls, computer data or television pictures as pulses of laser light in hair-thin glass strands – has been boosted by British Telecom. The new support takes the form of financial backing for a Chair of Optical Communications at Southampton University.

First holder of the new post is Professor Alec Gambling, formerly head of the University's Department of Elec-

tronics. Dr John Midwinter, head of optical communications studies at the Post Office's Research Centre at Martlesham, is made a visiting professor at the University.

Mr John Whyte, deputy managing director, British Telecom, with special responsibility for technology, said: "This new Chair will give added impetus to the university's work on optical communications, which has already earned it world-wide recognition. In particular, it will form the basis for developing a joint Post Office-university research and development programme."

## Third Madley aerial

Work has begun on a third space communications aerial at British Telecom's satellite earth station near Madley in Herefordshire. This latest 32-metre dish is needed to meet the continuing huge growth in overseas phone calls – doubling every four to five years – and to provide links between Britain and other countries.

Total cost of the project, due for completion in mid-1981, is more than £7.5 million. The new aerial will work to a satellite in geo-stationary orbit 23,000 miles above the Indian Ocean. A second Madley aerial which went into service in March beams calls to a satellite positioned over the Atlantic. The first aerial, operating for more than a year, works to a satellite over the Indian Ocean.

Madley carries more than a million calls a month between Britain and some 40 other countries.

## Profit down

A profit of £60 million was made by British Telecom during the first half of the 1979/80 financial year – about £84 million down on the corresponding period in 1978/79. It is predicted however, that the January tariff increase, will ensure the Business remains in the black and meets its Government set target of five per cent return on net assets. Overall Post Office profit for the first half of the year was about £49 million.

## Energy and power

The second International Telecommunications Energy Conference (INTELEC 1979) held in Washington DC was attended by more than 450 delegates from all over the world and more than 80 papers were presented on a wide range of power and energy topics.

The three-strong British Telecom

First holder of the 'British Telecommunications Chair in Optical Communications', Prof. Alec Gambling (centre) discusses Telecom plans for optical fibres with Mr John Whyte (left) and Dr John Midwinter. (see: Optical fibre chair).



delegation presented various papers all of which were well received and useful discussions followed each of them.

The third INTELEC conference will be held in London during May next year. Further information can be obtained from the INTELEC conference Department, IEE, Savoy Place, London, WC2R 0BL.

### Contracts

**Multitone Electric Co Ltd** - £2 million for high-speed digital pocket paging receivers. Delivery of the receivers, to meet the growing number of subscribers to the Post Office's Radiopaging Service, will be completed by March next year.

**Standard Telephones and Cables Ltd** - £750,000 for audio circuit network amplifiers, signalling unit racks and test equipment totalling more than £500,000, and data modems for an associated company, Standard Radio & Telefon of Stockholm, worth £250,000 for equipment to connect low-speed data devices - like tele-typewriters - to computer systems over the telephone network.

**Plessey Telecommunications Ltd** - £1.25 million for transmission equipment which will be supplied late next

year and into early 1982. The equipment is for 16 Post Office repeater stations around the UK, including Aldershot, Andover, Cambridge, Edinburgh, Glasgow, Leominster, London, Manchester, Newport (Gwent), Nottingham, Oxford and Reading. The order also includes a 12 megahertz line system for the Leeds Tinshill radio station.

**Standard Telephones and Cables Ltd** - £13 million for pushbutton telephones and receiver and transmitter capsules including a contract worth more than £7 million for STC Quickstep Deltaphones, - the largest ever single order for telephones placed with one company by the Post Office. Apart from the Deltaphones - which the Post Office offers as Pushbutton Trimphones - STC is also supplying type 756 phones, the pushbutton version of the standard rotary dial phones.

**Plessey Controls Ltd** - More than £1 million for the supply of three 4660/Model 20 systems which will be used as line concentrators to extend the subscriber connection capacity of the inland Strowger telex network. Model 20 is a fully electronic SPC system. Each of the three systems will enable a further 1,000 subscribers to be connected to the UK telex network.

**Standard Telephone and Cables Ltd** - Over £2 million for 30,000 compact pagers, representing the largest-ever single order for radiopagers. They are of an advanced wide-area type, and the contract calls for delivery within 12 months.

### More on IDD

Poland and Nicaragua have become the latest countries which Britain's phone users can dial themselves without having to go through the operator. People from Poland make about 15,000 calls to the UK every month and receive about the same number from Britain.

Currently 93 per cent of all international calls from the UK are made without operator help.

### Canada extension

IPSS - the world's first public inter-continental packet-switching data service - has now been extended to Canada. It is a two-way transatlantic data link that enables users in this country to call up computers in Canada and lets Canadians 'talk' to computers in Britain. The service began just over a year ago between the UK and the USA.

The use of packet switching - in

**SEI**  
*provide a wide  
range  
of components  
and services  
for the  
Post  
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Audio Transmission Units  
Bell Units  
Beeper Transformers  
Capacitors  
Development Facilities  
Electronic Board Assembly Facilities  
Electronic Design Facilities  
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which data is transferred in self-contained self-addressed blocks, or packets — means that customers' terminals no longer need to be compatible with the computer to which they are linked.

IPSS is based on an international packet-switching exchange (PSE) in London. This was installed with the aim of making it the hub of a series of packet-switched 'spokes' radiating from Britain. With the 'spoke' to Canada connected, the Post Office has now begun to extend the network as planned, and it hopes to link up other countries later this year.

### Euronet inaugurated

EURONET/DIANE, the EEC-based computer information service which gives users in the nine member countries immediate access to a wealth of legal, medical, scientific, technical and socio-economic data stored on computers (see *Telecommunications Journal*, Autumn 1979), has been inaugurated by Mr Peter Benton, managing director of British Telecom and his counterparts throughout the Common Market.

Typical users are national and local government offices, research centres, educational establishments, public corporations and industrial and financial institutions.

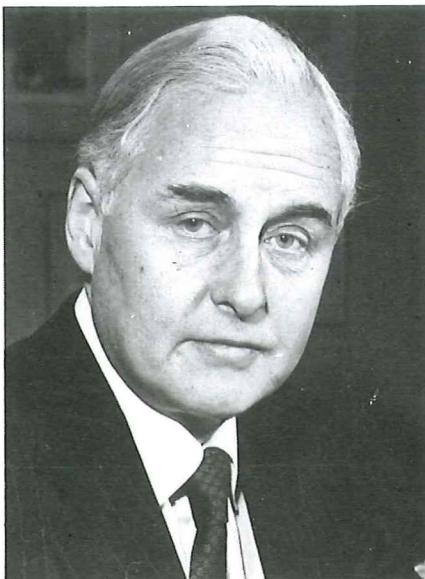
The host computers and their databases are known collectively as DIANE — Direct Information Access Network for Europe. EURONET is the communications system — using the packet switching technique of data transmission — linking customers and computers.

Customers are linked to the computers through packet-switching exchanges (PSES) in London, Frankfurt, Paris and Rome, or through remote access centres in Amsterdam, Brussels, Copenhagen, Dublin and Luxembourg. The network management centre, responsible for supervising EURONET's day-to-day operation, is housed in London and operated by British Telecom.

### A further step

Orders for 10 140 Mbit/s digital transmission systems have been placed by British Telecom — a further step along the road to a revolutionary new communications network that will transform Britain's telephone service and carry it into the next century.

The initial orders — for high-capacity, long-distance systems conforming to international standards — represent the first major step by the Business towards a nationwide digital network



**Chairman Sir William Barlow is to leave the Post Office later this year on completion of the planning work for the separation of the postal and telecommunications businesses.**

**Sir William, who was appointed for a five year period in November 1977 has expressed a desire to return to the 'cut and thrust' of the private sector. The reorganisation exercise is progressing well and the main decisions on internal changes are expected to have been taken by June.**

linking Britain's main population centres.

Creating such a network is an essential part of British Telecom's plans for introducing System X telephone exchanges during the 1980s. These first orders — worth a total of £1.2 million — have been placed with Standard Telephones and Cables Ltd and with GEC Telecommunications Ltd following three years of development between the companies and the Post Office.

The 10 140 Mbit/s systems, with a total length of 290 km. are due to come into service during the first half of 1982, and will interconnect Leeds, Sheffield, Wakefield, Barnsley, Huddersfield, Manchester and Chesterfield, as well as linking Chester with Liverpool.

### Boost for Prestel

Plans to boost Prestel, the world's pioneer viewdata service, and to make it available to 13 million phone-users throughout the UK by the end of the year have been announced. It means that about 50 per cent of telephone

subscribers will be within local call range of Prestel and the present total of 2,400 subscribers to the system could increase by tens of thousands in 1980.

The plans are based on firm forecasts by manufacturers who produce the special television sets which receive Prestel. Mr Peter Benton, managing director, British Telecom, said he was delighted at this support from industry, which would enable Prestel to be brought into the homes and offices of millions of people throughout the country.

More than 150,000 Prestel 'pages' are now on call in Britain providing facts on services and subjects ranging from accounting, agriculture and air travel to used cars, wine and yoga. The service is already available in London, Birmingham, Nottingham, Edinburgh and Glasgow and during the year other centres throughout Britain will join the network.

As well as this, Prestel has launched a market trial of its international service. Using a database in London, businessmen in Sweden, West Germany, the Netherlands, Switzerland, Australia and the USA will be able to call up from their desks vital international business information such as share prices company 'profiles', fluctuating exchange rates and commodity prices.

### Autotelex boost

Telex subscribers in Nigeria, French Polynesia, the Cook Islands, Guyana, St Lucia, the Cayman Islands and St Pierre and Miquelon are the latest to become available to Britain's autotelex users. This further expansion of the service brings to more than 150 the number of countries which can be dialled direct.

### Radio on

The latest step in plans to improve ship-to-shore communications round Britain's coastline has been taken with the opening of a radio station on the Isle of Islay, in the Hebrides.

Islay Radio, controlled from Portpatrick, is the second remotely-controlled station opened this year. The first was on the Isle of Skye in February. The new station is part of a five-year programme for improving communications with coastal shipping and pleasure craft.

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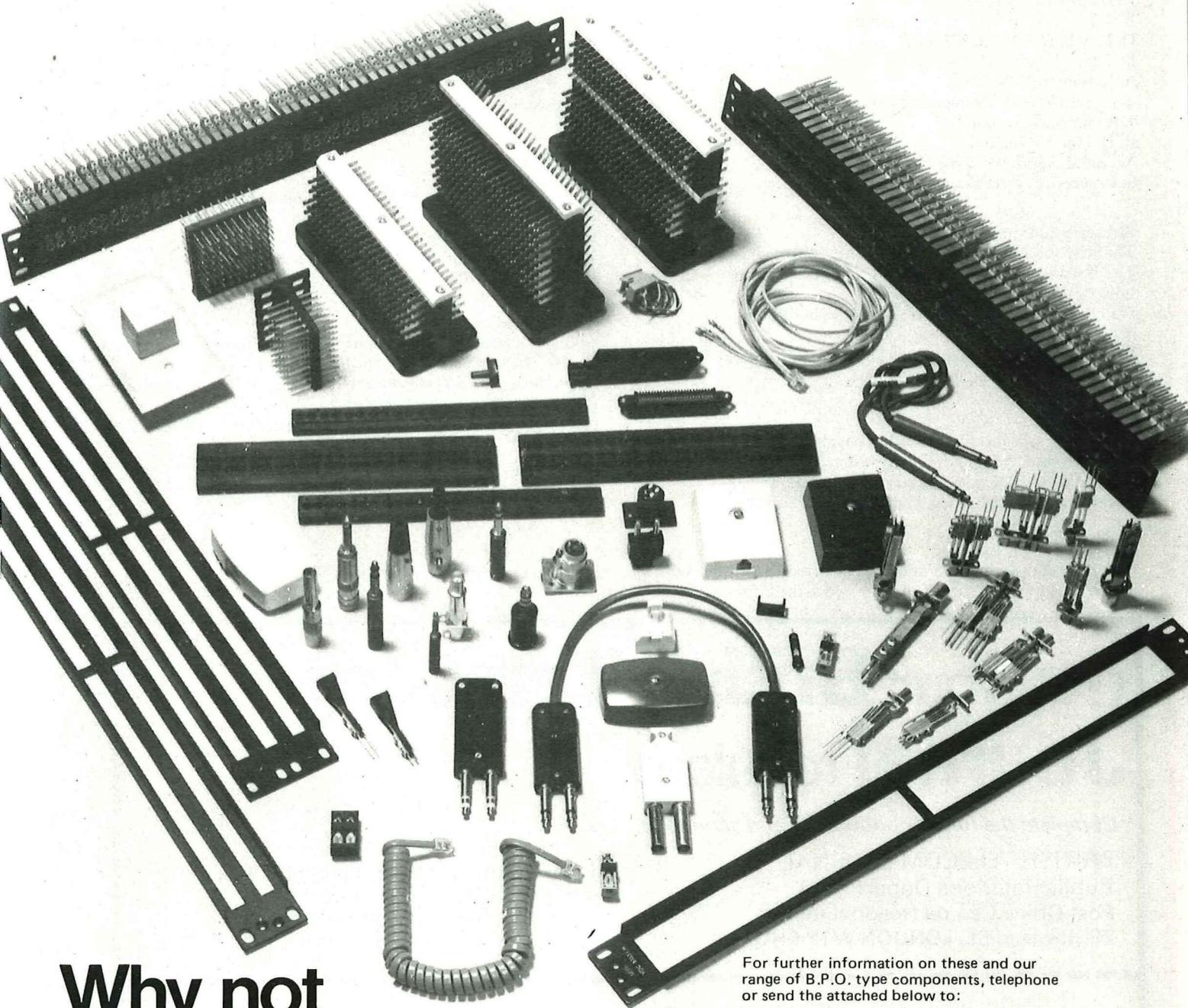
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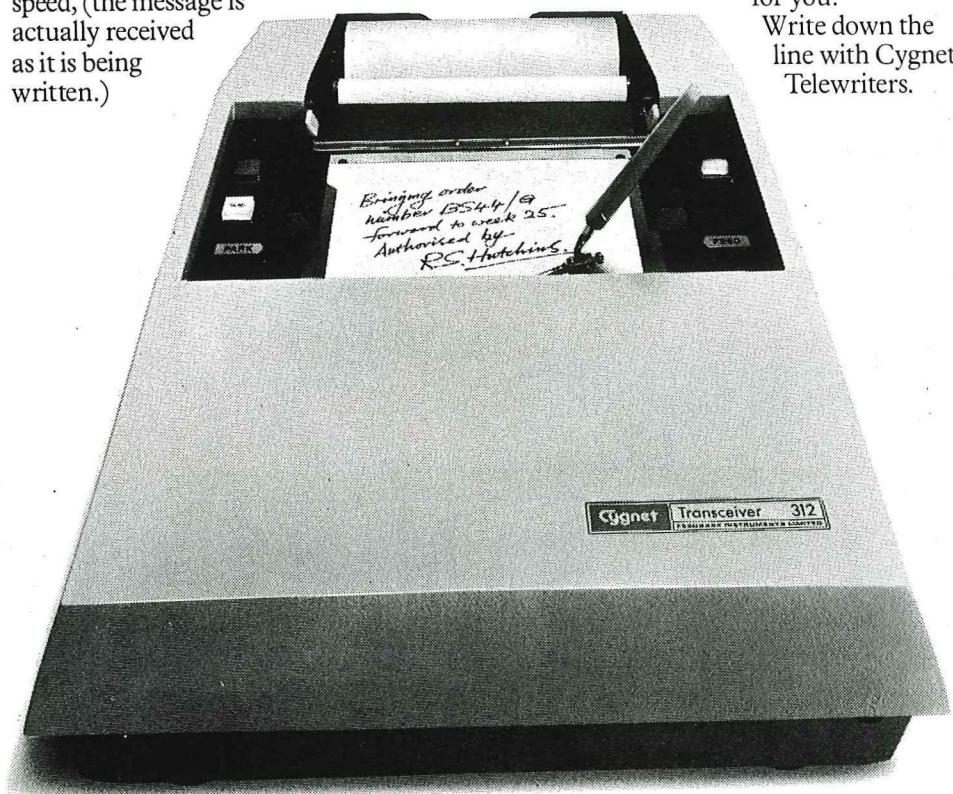
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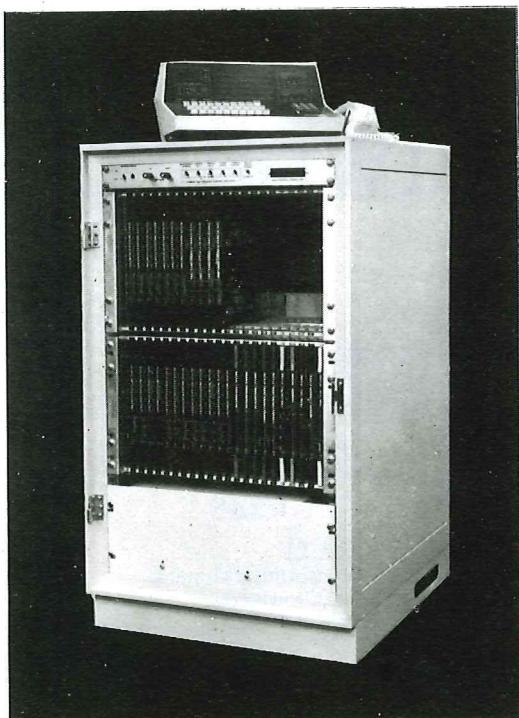
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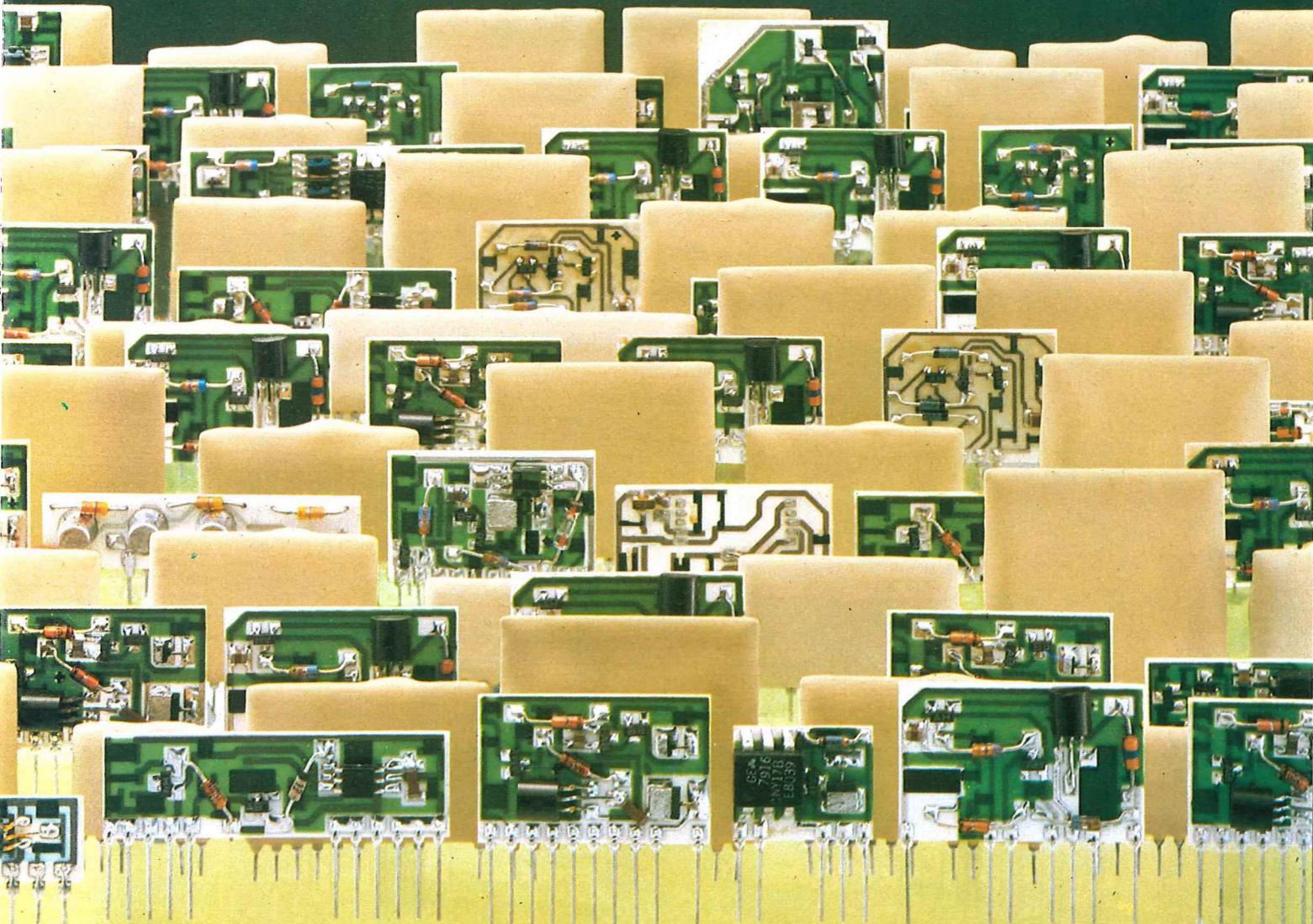
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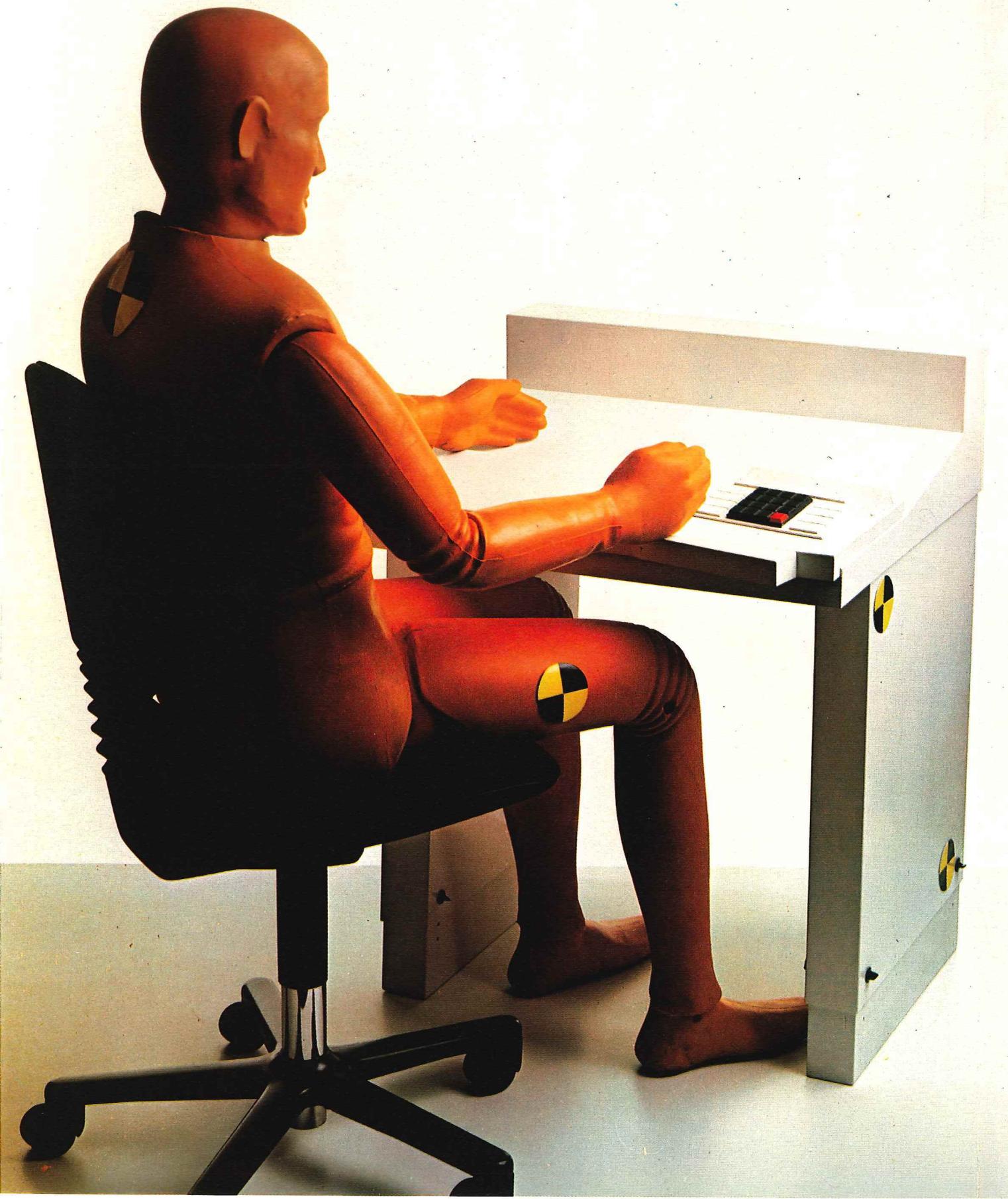


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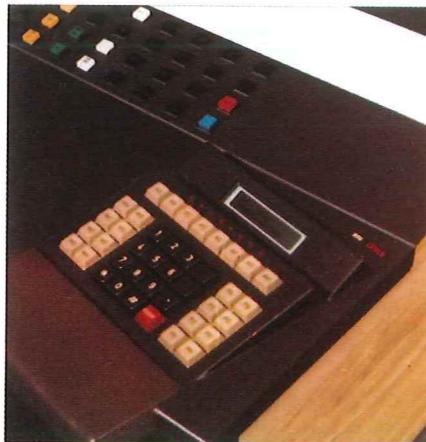
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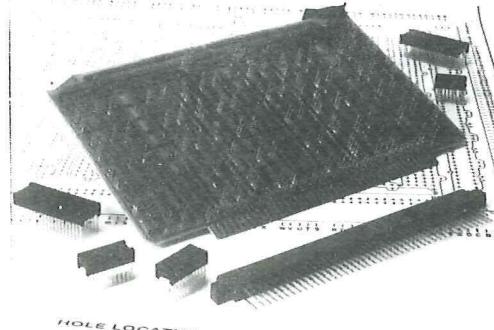
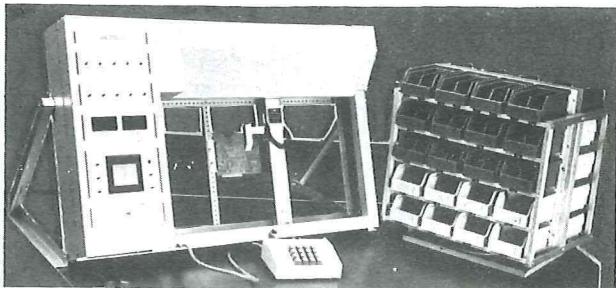


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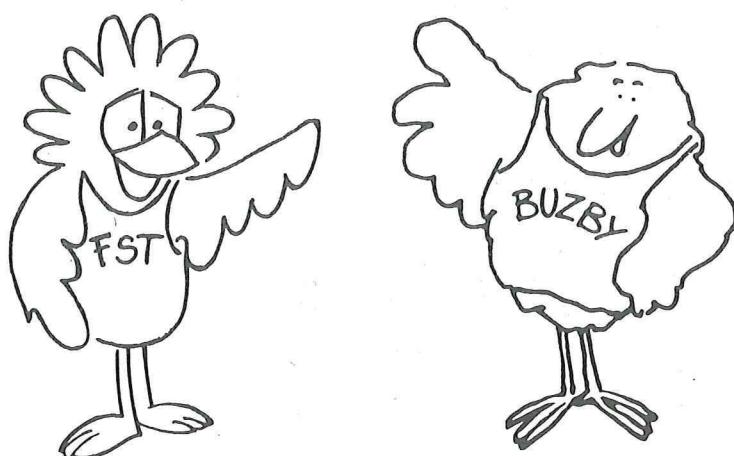
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We offer one or all of the following as required.

#### The basic frame-work with:—

* jumper rings	* fuse mountings
* guard rails	* fanning strips
* wall brackets	* lightning protectors
* connection strips	* jacks test etc.

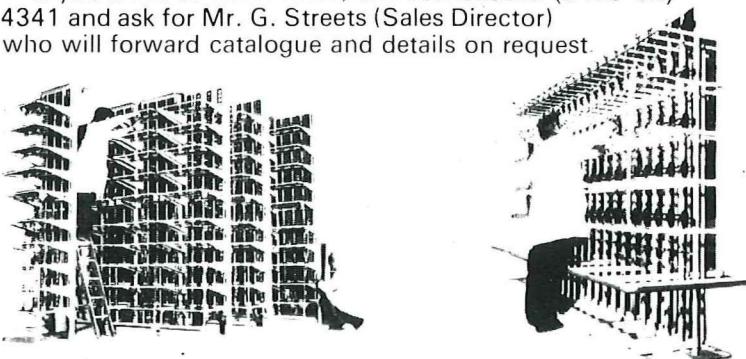
All you need tell us is the code for the framework required or, failing that, just tell us the size and the number of lines: we'll tell you the rest.

We also manufacture all the ancillary items that you will need in installing a distribution frame i.e.

* Tie Bars	* Clamps
* Cable Runways	* Brackets
* Bus Bars	etc.

and would be pleased to advise you on your layout and installation.

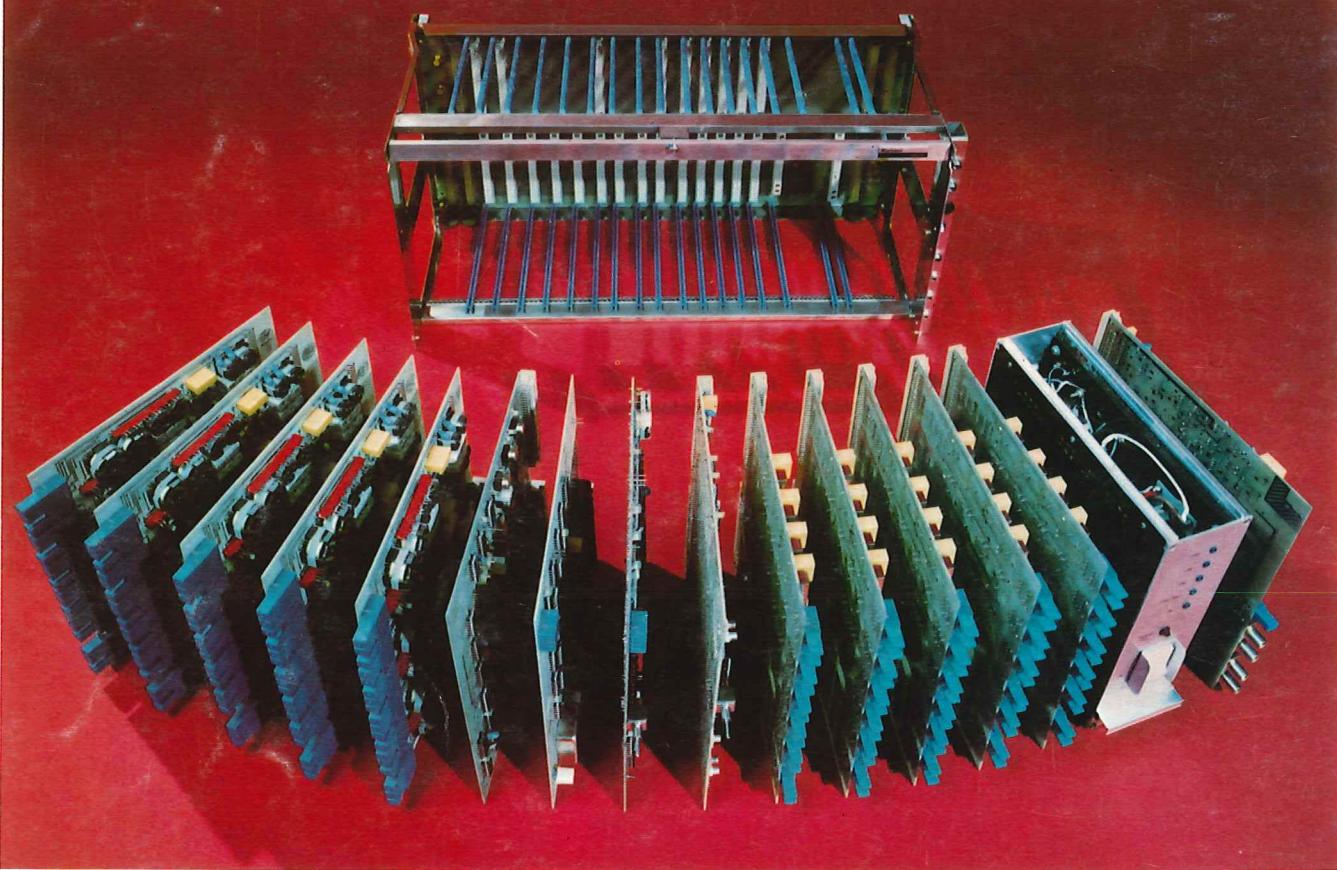
If you'd like to know more, dial Stonehouse (0453-82) 4341 and ask for Mr. G. Streets (Sales Director) who will forward catalogue and details on request.



 **Cableways Limited**  
Ryeford Works, Stonehouse, Gloucestershire GL10 3HE  
Telephone: Stonehouse (0453-82) 4341 Telex No 43456

We currently supply to: BPO · Plessey · Standard Telephones and Cables · GEC · PYE TMC ·  
Thorn Ericsson · Cable and Wireless · International Air Radio · Electricity Boards and Gas Boards.

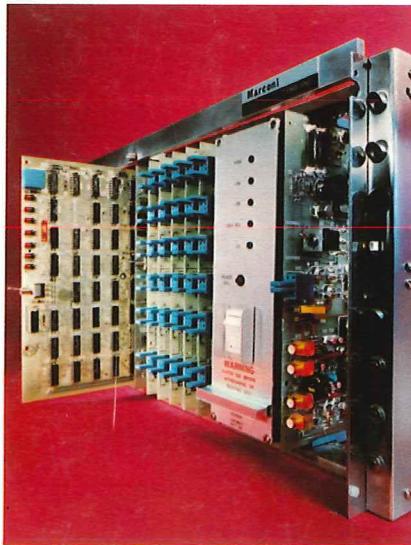
# Look what happens when we rack our brains



Small may be beautiful, but microminiaturization is no easy task. Even when, like Marconi, you have been designing, developing and manufacturing PCM digital transmission systems since 1967.

Our new third-generation system embodies years of experience in this field. Designed for the international marketplace and conforming fully with CEPT and CCITT 30-channel recommendations, the system finds wide application in junction, trunk, local and data networks, and forms the basic building block in the creation of an all-digital integrated services network.

The use of the latest LSI and microprocessor technology, in the



new British transmission equipment practice, has resulted in a very compact, reliable and flexible design. Timeslot access facilities are provided to permit speech, data and music channels to be multiplexed together; and the use of a microprocessor-based signalling sub-system allows a wide variety of exchange interfaces to be provided.

As well as the basic 30-channel equipment, Supergroup and Hypergroup codecs will be available shortly, which will assist further in the introduction of digital working.

To find out more about Marconi's digital transmission systems, please contact Tony Trewin on Extension 556.

## Marconi Communication Systems Limited

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